Über dieses Buch

Dies ist ein digitales Exemplar eines Buches, das seit Generationen in den Regalen der Bibliotheken aufbewahrt wurde, bevor es von Google im Rahmen eines Projekts, mit dem die Bücher dieser Welt online verfügbar gemacht werden sollen, sorgfältig gescannt wurde.

Das Buch hat das Urheberrecht überdauert und kann nun öffentlich zugänglich gemacht werden. Ein öffentlich zugängliches Buch ist ein Buch, das niemals Urheberrechten unterlag oder bei dem die Schutzfrist des Urheberrechts abgelaufen ist. Ob ein Buch öffentlich zugänglich ist, kann von Land zu Land unterschiedlich sein. Öffentlich zugängliche Bücher sind unser Tor zur Vergangenheit und stellen ein geschichtliches, kulturelles und wissenschaftliches Vermögen dar, das häufig nur schwierig zu entdecken ist.

Gebrauchsspuren, Anmerkungen und andere Randbemerkungen, die im Originalband enthalten sind, finden sich auch in dieser Datei – eine Erinnerung an die lange Reise, die das Buch vom Verleger zu einer Bibliothek und weiter zu Ihnen hinter sich gebracht hat.

Nutzungsrichtlinien

Google ist stolz, mit Bibliotheken in partnerschaftlicher Zusammenarbeit öffentlich zugängliches Material zu digitalisieren und einer breiten Masse zugänglich zu machen. Öffentlich zugängliche Bücher gehören der Öffentlichkeit, und wir sind nur ihre Hüter. Nichtsdestotrotz ist diese Arbeit kostspielig. Um diese Ressource weiterhin zur Verfügung stellen zu können, haben wir Schritte unternommen, um den Missbrauch durch kommerzielle Parteien zu verhindern. Dazu gehören technische Einschränkungen für automatisierte Abfragen.

Wir bitten Sie um Einhaltung folgender Richtlinien:

+ *Nutzung der Dateien zu nichtkommerziellen Zwecken* Wir haben Google Buchsuche für Endanwender konzipiert und möchten, dass Sie diese Dateien nur für persönliche, nichtkommerzielle Zwecke verwenden.

+ *Keine automatisierten Abfragen* Senden Sie keine automatisierten Abfragen irgendwelcher Art an das Google-System. Wenn Sie Recherchen über maschinelle Übersetzung, optische Zeichenerkennung oder andere Bereiche durchführen, in denen der Zugang zu Text in großen Mengen nützlich ist, wenden Sie sich bitte an uns. Wir fördern die Nutzung des öffentlich zugänglichen Materials für diese Zwecke und können Ihnen unter Umständen helfen.

+ *Beibehaltung von Google-Markenelementen* Das "Wasserzeichen" von Google, das Sie in jeder Datei finden, ist wichtig zur Information über dieses Projekt und hilft den Anwendern weiteres Material über Google Buchsuche zu finden. Bitte entfernen Sie das Wasserzeichen nicht.

+ *Bewegen Sie sich innerhalb der Legalität* Unabhängig von Ihrem Verwendungszweck müssen Sie sich Ihrer Verantwortung bewusst sein, sicherzustellen, dass Ihre Nutzung legal ist. Gehen Sie nicht davon aus, dass ein Buch, das nach unserem Dafürhalten für Nutzer in den USA öffentlich zugänglich ist, auch für Nutzer in anderen Ländern öffentlich zugänglich ist. Ob ein Buch noch dem Urheberrecht unterliegt, ist von Land zu Land verschieden. Wir können keine Beratung leisten, ob eine bestimmte Nutzung eines bestimmten Buches gesetzlich zulässig ist. Gehen Sie nicht davon aus, dass das Erscheinen eines Buchs in Google Buchsuche bedeutet, dass es in jeder Form und überall auf der Welt verwendet werden kann. Eine Urheberrechtsverletzung kann schwerwiegende Folgen haben.

Über Google Buchsuche

Das Ziel von Google besteht darin, die weltweiten Informationen zu organisieren und allgemein nutzbar und zugänglich zu machen. Google Buchsuche hilft Lesern dabei, die Bücher dieser Welt zu entdecken, und unterstützt Autoren und Verleger dabei, neue Zielgruppen zu erreichen. Den gesamten Buchtext können Sie im Internet unter `http://books.google.com` durchsuchen.

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google books

https://books.google.com

Princeton University Library
32101 076428901

Digitized by Google

HE100
.R13

Library of
Princeton University.

The Eighty Eight Library
of
Economics.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

THE

RAILWAY MAGAZINE.

VOL. XLVI.

JANUARY TO JUNE.

1920.

LONDON:
30, FETTER LANE, FLEET STREET, E.C.4.

Digitized by Google

(RECAP)
HE1001
.R13
v. 46
(Jan.-June 1920)

LONDON:
HARRISON AND SONS, PRINTERS IN ORDINARY TO HIS MAJESTY
45-47, ST. MARTIN'S LANE, W.C. 2.

Digitized by Google

INDEX TO VOL. XLVI.

Articles.

PAGE

Australia, Suburban Electric Traction in: Equipment of Melbourne Suburban Lines 143
Barnstaple and Ilfracombe Railway .. .. *Frank E. Box* 24, 80
British Locomotive Practice and Performance .. .. *Cecil J. Allen* 30, 102, 165, 238, 301, 394
Chinese Government Railways, Shanghai-Nanking Line .. .. *C. L. G. Wayne and C. L. W. Bailey* 287 386
Congestion, Railway. The one remedy for .. .. *Charles Travis* 331
Great Northern Railway: New 2-6-0 Express Goods Locomotive 236
Lancashire and Yorkshire Railway: Oldham Road Goods Station, Manchester .. .. *Chas. S. Lake* 8
Locomotive and Train Working in the latter part of the 19th Century—
Midland Railway .. .. *E. L. Ahrons* 19, 85, 153
North British Railway .. .. *E. L. Ahrons* 222, 325, 370
London and North Western and London Electric Railways: New Joint Electric Rolling-Stock 321
London and South Western Railway: Feltham Concentration Yard 90
London and South Western Railway reached Waterloo, How the .. .. *H. H. Meik* 254
Mesopotamian Railways .. .. *A. Vowles* 163
Metropolitan Railway: Reconstructed Electric Cars 97
Midland Railway, Banking Trains on the Lickey Incline .. .. *Chas. S. Lake* 382
North British Railway: Cadder Gravitation Marshalling Yard 316
North Eastern Railway: From Darlington to Tebay and Penrith .. .. *H. L. Hopwood* 73, 157
Notable Railway Stations and Their Traffic:—
St. David's, Exeter, Great Western Railway .. .. *J. F. Gairns* 359
Pennsylvania Railroad: 2-8-8-0 Simple Articulated Locomotive.. 183
Signalling, Speed, on the Victorian Government Railways.. 375
South Eastern and Chatham Railway: Three-Position Signalling at Victoria 177
South Eastern and Chatham Railway: Retirement of Sir Francis Dent 252
Spain, First Underground Railway in 184
Traffic Problem, The Railway .. ..*Charles Travis* 116
War, Railway Reminiscences of the .. .. *Lord Monkswell* 1
West London, Transport Development in: Central London and London and South Western Railways *F. Gilbert* 231
West London and West London Extension Railways .. .. *W. J. Scott* 215, 293

Locomotives, Illustrations.

Alsace-Lorraine 214, 235
American 79, 272, 417
Caledonian 32, 33, 109, 164
Campbeltown and Macrihanish Light 114
Chinese 290–292, 390, 391
Cork, Bandon and South Coast Railway 175
County Donegal Joint Committee 405
French 1, 3, 4, 284
German 89
Glasgow and South Western 89, 102, 162
Great Central 31, 238, 337, 396, 398, 399
Great Eastern 38, 165, 314
Great Northern 39, 111, 172, 236, 240, 246, 307, 309, 310, 312
Great Western 30, 41, 42, 52, 171, 245, 285, 404, 406
Highland 35
Indian 221, 263
Lancashire and Yorkshire 50, 113, 133, 304
London and North Western 36, 103, 107, 110, 239, 242–244, 305, 311, 401, 402, 412
London and South Western 40, 69, 82, 166, 168-170, 301, 303, 400
London, Brighton and South Coast 248, 299, 302, 394
Mesopotamian 163, 164
Midland 22, 85-88, 101, 105, 153-156, 383, 384
Mid-Suffolk Light 250
New South Wales Government 315
New Zealand 96
North British 35, 222-229, 325-330, 370–374
North Eastern 23, 104, 158, 211, 333, 393
Pennsylvania 187
South Eastern and Chatham 37, 106, 126, 173, 249, 403
Swiss 202
West Clare 251

443391
Digitized by Google

Miscellaneous.

PAGE
American 4-4-2 Locomotive, A Remarkable .. 79
Assam-Bengal Railway: 4-6-0 Mixed Traffic Locomotive .. 263
Bengal-Nagpur Railway: Bombay-Calcutta Express Train taking Water .. 221
Caledonian Railway: Lochearnhead Viaduct .. 45
Glasgow and South Western Railway: 0-6-2 Tank Engine .. 163
Lancashire and Yorkshire Railway: "Slipping" at Rochdale .. 50
Locomotive, Surrendered German, consigned to Poland .. 89
London and South Western Railway: War Memorial at Waterloo .. 71
Midland Railway: Interesting Locomotive Comparison at St. Pancras .. 101
Motor Transport Up-to-Date: "The New Competitor" .. 406
New South Wales Government Railways: Oldest Locomotive under Steam .. 315
New South Wales Government Railways: Petrol Rail Motor Car .. 230
New Zealand, Goods Train Working in .. 97
North Eastern Railway: 4-8-0 Three-Cylinder Tank Engine .. 23
North Eastern Railway; 4-6-0 Three-Cylinder Express Goods Locomotive .. 393
North Eastern Railway: Emergency Storage Accommodation at Hull .. 176
North Eastern Railway, Double-heading on the .. 333
Order of the British Empire, The Most Excellent .. 336
Pennsylvania Railroad: 250-ton Electric Locomotive .. 187
South Eastern and Chatham Railway: 25-ton Goods Brake Van .. 257

Pertinent Paragraphs

.. 51, 125, 194, 264, 342, 412

Plates.

Great Central Railway: 4-4-0 Superheater Express Locomotive No. 506, "Butler-Henderson" .. *facing* 287
Great Western Railway 4-6-2 Locomotive No. 111, "The Great Bear" .. 1
London and South Western Railway: 4-6-0 Express Goods Locomotive, No. 498 .. 359
Midland Railway, Four-Cylinder 0-10-0 Banking Engine, No. 2290 .. 215
Pennsylvania Railroad, 2-8-8-0 Simple Articulated Locomotive .. 143
South Eastern and Chatham Railway: Rebuilt Superheater Express Locomotive No. 179 .. 73

Railway Portrait Gallery.

Mr. J. H. H. Bailey, Goods Manager, North Staffordshire Railway .. 136
Mr. J. F. Bradford, Superintendent, Central District, London and North Western Railway .. 352
Sir Francis H. Dent, General Manager, South Eastern and Chatham Railway, 1911-1920 .. 253
Major S. E. Fay, Traffic Department, San Paulo Railway, Brazil .. 137
Lieutenant-Colonel C. J. H. Francis, Chief Storekeeper and Purchasing Agent, London and South Western Railway 138
Mr. O. C. Gatenby, Mineral Manager, Great Central Railway .. 351
Mr. A. Gostling, Agent, Royal Mint Street, Great Northern Railway 1898–1919 .. 424
Mr. T. C. Higgins, late Mineral Manager, Great Central Railway .. 278
Mr. J. E. Jerrett, Stationmaster, Waterloo, London and South Western Railway .. 422
Mr. J. Johnson, Claims and Salvage Agent, Great Western Railway .. 208
Mr. John Lea, Stationmaster, St. David's Station, Exeter, Great Western Railway .. 368
Mr. C. L. Macdona, Traffic Department, Beira, Mashonaland and Rhodesia Railway .. 279
Mr. Charles S. Page, Assistant General Manager, Cardiff Railway .. 421
Mr. C. A. Patey, District Traffic Manager, Exeter, Great Western Railway .. 368
Mr. P. H. Price, Secretary, Railway Clearing House .. 66
Mr. W. A. Ree, Outdoor Goods Manager, London and North Western Railway .. 277
Mr. Jas. A. Robinson, Assistant to Chief Mechanical Engineer, Great Western Railway .. 420
Mr. Cecil G. Rose, Assistant Engineer, North Staffordshire Railway .. 137
Major Eric W. Rostern, M.C., Railway Adviser, Inter-Allied Administrative Commission .. 208
Mr. T. W. D. Smith, Development Agent for Cardiff .. 353
Mr. W. A. Stanier, Locomotive Works Manager, Swindon, Great Western Railway .. 207
Mr. Joseph Tatlow, Director, Midland and Great Western Railway .. 357
Mr. P. C. Tempest, C.B.E., General Manager and Chief Engineer, South Eastern and Chatham Railway .. 334
Sir William Towle, Manager of the Midland Hotels, 1871-1914 .. 138
Mr. Howard Williams, C.B.E., General Manager, Central Argentine Railway .. 393
Mr. Wilson Worsdell, the late, Chief Mechanical Engineer, North Eastern Railway, 1890-1910 .. 352

Railway Literature

.. 72, 142, 206, 286, 356, 427

The Why and the Wherefore

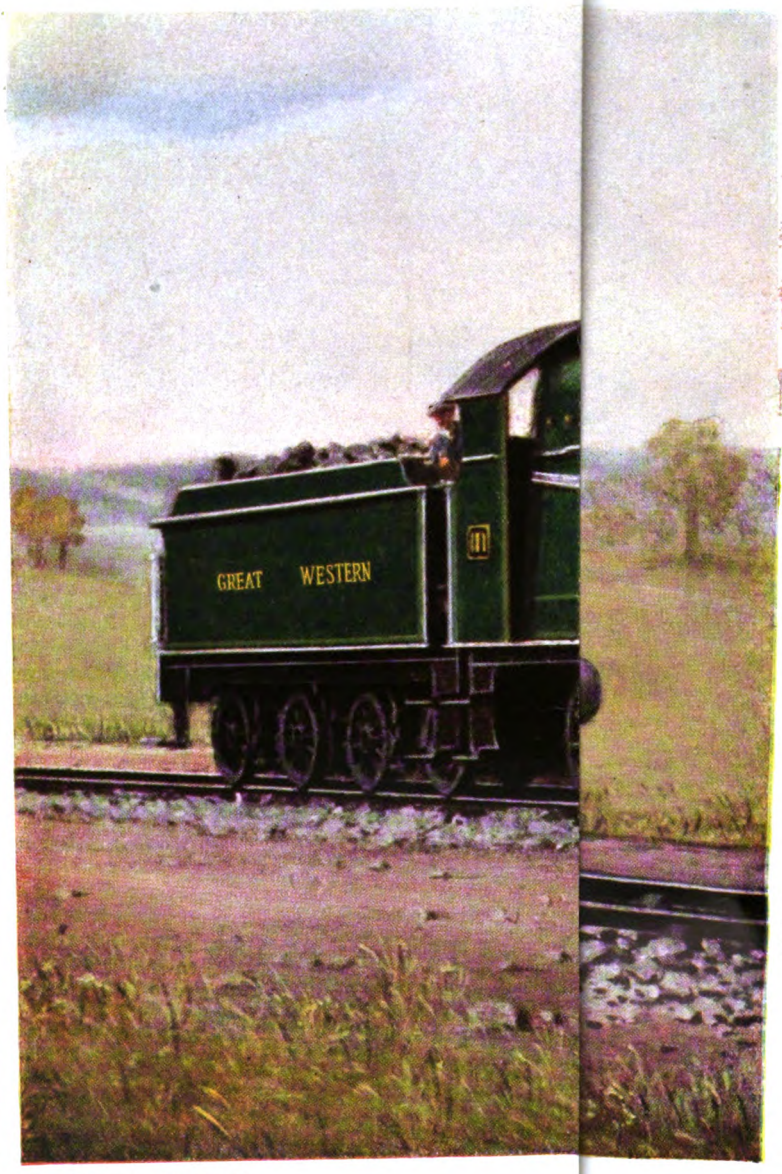
.. 46, 120, 188, 258, 338, 407

What the Railways are Doing

.. 66, 136, 207, 277, 351, 420

Digitized by Google

Digitized by Google



THE RAILWAY MAGAZINE.

GREAT WESTERN

De

Cylinders (4) : 15

Steam Pressure : 225 lbs.

Weight on coupled wheels, 60 tons. Total

Digitized by Google

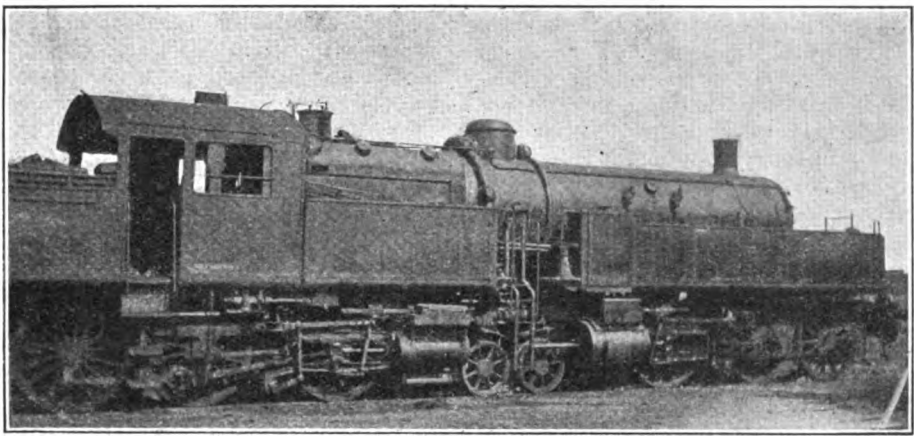


Photo.] C. DE FER DU NORD. [*Lord Monkswell.*

0-6-2 : 2-6-0 articulated tank engine used for heavy gradient traffic.

Railway Reminiscences of the War.

By LORD MONKSWELL.

TRAVELLING by railway in war-time is not a rapid process, and when troops are being moved in large numbers every available route has to be utilised, so that some very roundabout journeys have to be made. Thus, while taking an infinitely small part in the military operations in France, I made the acquaintance in the course of various journeys in numerous directions of many lines that would otherwise have remained unknown to me. On one occasion I accompanied a cavalry regiment from Marseilles to Orleans, travelling via Toulouse, a journey which took from mid-day on Friday to Sunday evening. At the goods station behind the docks at Marseilles we arrived early in the morning, and there found drawn up for us a train consisting of a six-wheeled corridor carriage and some 30 or 35 covered wagons. Two hundred horses were with varying degrees of persuasion induced to enter the wagons assigned for their transport—in each wagon eight horses arranged four and four, with their noses inwards. The officers and non-commissioned officers occupied the corridor carriage, and 150 men having bestowed themselves and their kit in the remaining covered wagons, the train, which was one of three required for the transport of a single regiment, was ready to start, which it did behind a big 2–8–0 goods engine. Slight incidents marked the passage of the afternoon —telephoning from the stationmaster's office at one stopping-place instructions to a man who had contrived to get left behind at the stopping-place before, or half an hour's struggle to get a fallen horse on to his feet. At Arles we left the P.L.M. main line and branched off westwards, and, after an attempt to get dinner in the refreshment room at one of the stations at which we stopped had ended in complete failure, we stilled the pangs of hunger on bread and chocolate and stretched ourselves out to sleep on the seats of the carriages, each officer having the luxury of a whole side to himself.

A dismal scene of wet and muddy railway sidings met our eyes when we woke the next morning to find ourselves at Castelnaudary, on the Midi line, with an hour to wait. The first thing to be done was to find some hot water to make tea for the men. A wild hunt through the station buildings failed to reveal the presence of any supply adequate for the needs of 150 thirsty throats, so the only thing to be done was to bring the pails,

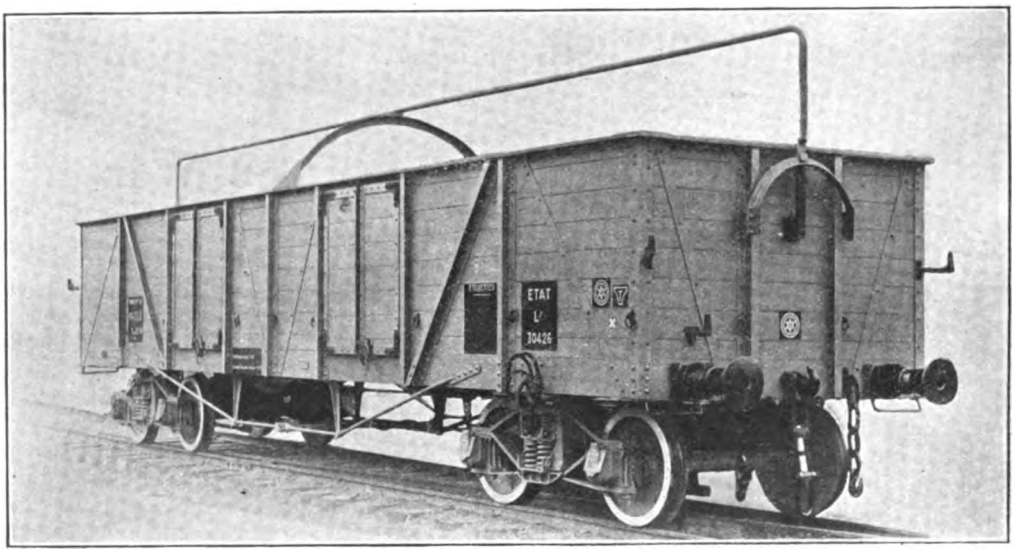
Digitized by Google

in which the tea, together with perhaps twice as much brown sugar, had been heaped, to the engine and fill them with hot water from the boiler. This done, we went off to get breakfast at a café outside the station, and on our return we learned that we had nearly been left behind. A misunderstanding, it appeared, had arisen about the starting of the train. The stationmaster had wished to start it without us, and had only been prevented from doing so by one of the sergeants taking up a firm position between the rails in front of the engine and refusing to move.

A couple more hours brought us to Toulouse, where we stayed long enough to water the horses and give the men time to fry themselves some bacon on the braziers beside the line in the carriage sidings, and then, behind a P.-O. engine, on through the rain to Cahors, where the principal stop of the day took place, lasting from 3 p.m. to 7 p.m. By this time, fortunately, it had dried up, so the operations of watering the horses and cooking rations in the open were not so difficult as they might otherwise have been.

At Cahors, among other traces of the war, were seven old 4-4-0 Nord engines standing in the sidings, whither they had evidently been evacuated to make room for more serviceable machines from Belgium and the occupied parts of France, which had been withdrawn in time to escape the German invasion. These old Nord machines were here at least 350 miles from the nearest point on their own line.

Tea, which was kindly given us in the station hospital by a French Red Cross nurse and her husband, a wounded officer, followed by an excellent dinner in the refreshment room, passed the time pleasantly till we started again and shortly settled down to our second night in the train. Proceeding slowly onwards in this way along this important branch of the P.-O. line—which in a general way is so little known to British travellers in spite of the great natural beauty of some of the country it traverses—through tunnels and over bridges and viaducts, all strictly guarded, with the country people waving to us as we passed, our journey drew to an end. We reached Vierzon at sunset, and during our last prolonged stop fortified ourselves with coffee and rolls and honey against the exacting task of detraining which was shortly in store for us. Before we started off again we had our first glimpse of a Red Cross train conveying wounded, which stopped at this station on its journey southwards. Then on again through the wet and the gathering gloom,

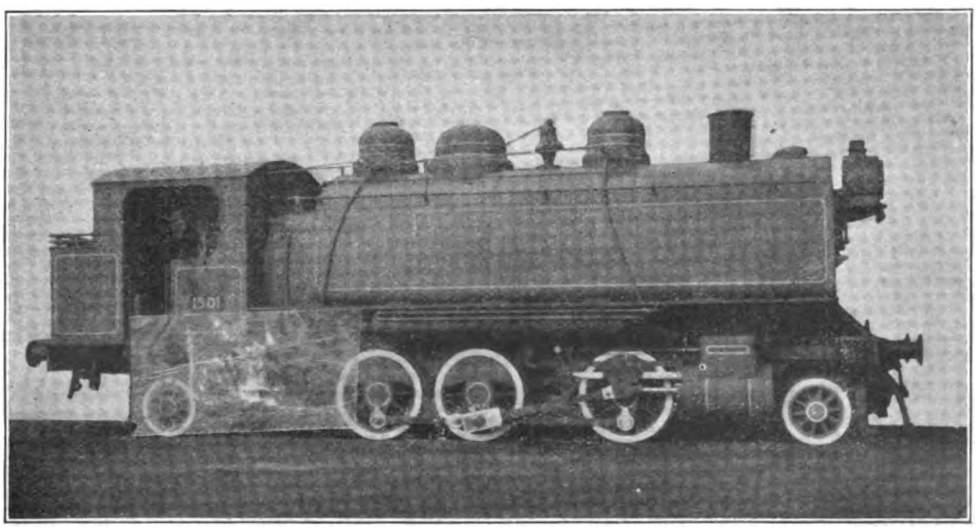


BOGIE HIGH-SIDED GONDOLA WAGON: FRENCH STATE RAILWAYS.

Digitized by Google

which shortly became darkness so intense that it was with difficulty that we detected the Loire as we crossed the bridge leading into Orleans, and we finally drew up at the detraining station of Les Groues, where the camp was situated, and the journey was over. The 200 horses were then detrained, and the subsequent history of how that trainload of men and horses proceeded through the inky blackness to the camp beside the railway line and there established themselves on the greasy slime which, with the help of further copious downpours, had by morning become a deep ocean of mud, has nothing to do with railways.

France, and for this purpose a triangle was shortly completed enabling trains to run through towards Boulogne instead of being obliged to reverse their direction, as had originally been the case. Longpré, in consequence of its importance as a railway centre, was also a very large centre for motor traffic, the lorries at one time occupying a side of one of the roads for a mile and a-half outside the town. For part of this distance the road ran beside the railway, and so many gaps were made in the hedges on either side of the line that the hedges almost ceased to exist. What with the numerous authorised and innumerable unauthorised level crossings,



BALDWIN 2-6-2 TANK LOCOMOTIVE USED BY BRITISH GOVERNMENT IN FRANCE.

A station that sprang into great prominence during the war was Longpré. It is situated in the Somme Valley, about half-way between Amiens and Abbeville, and is the junction between the Nord main line and two branch lines—one leading north-east to Doullens and Arras, and the other west to form a junction at Gamaches with the Nord Company's line from Paris to Le Tréport. After the Germans had failed to reach Paris in their first rush, the former branch line became one of the most important arteries of traffic between the Nord main line and the front, while the latter branch line was largely utilised to bring up men and supplies from the south and west of

this bit of the line must have been no favourite with the drivers at this time. This question of level crossings is one that never seems to have been seriously tackled in France. In big towns there are generally some means of crossing the railway otherwise than on the level, and wherever the natural lie of the ground makes it easy to build a bridge this has usually been done, though there are places where, an embankment having been built across quite an important road, the road has been raised to the level of the embankment so as to avoid the necessity of constructing a bridge to carry the railway. In the summer of 1915, I spent six weeks in the valley of the Somme between Abbeville

Digitized by Google

and Amiens, and was constantly riding about between these two points. In the whole 25 miles from Abbeville station to where the railway enters Amiens, I never discovered more than one place where it is possible to cross the railway otherwise than on the level.

In one respect Northern France will gain something from the war. The number of improvements that were effected in the railways behind the fighting line was very large. New lines have been built, existing lines doubled, new connections made and new goods yards laid out. In the autumn of 1915, I spent a month at Candas, and got to know the country round about pretty well. Along the Doullens-Amiens road, which passes a mile or two to the east of Candas, there was at that time no sign of a railway. But almost exactly a year later when I was riding along this road, at one point I saw no less than three trains in as many different directions. The improved connections include the conversion of various junctions into triangles; the one at Fontinettes outside Calais now allows trains from the direction of Boulogne to run straight through on to the line which runs in the direction of Lille, and will be particularly useful. I do not know how many miles of line there are now in Abbeville goods yard, but the amount must be very large—and so on at numerous places. A great deal of the new construction, of course, is not intended to be permanent, and a good deal more will not be of much use in peace time; but there remains a very large amount which will be extremely useful.

I first became acquainted with the goods yard at Arras one night in June, 1913, when a coal train from Lens, on the engine of which I was travelling, was held up here to allow an express train to pass. The next time I saw this spot was in December, 1916, when I passed it on my way to an artillery observation post which was situated in a loft in one of the houses which look across the railway to Beaurains. After this I had plenty of opportunity of getting to know thoroughly Arras station and goods yard in their altered condition. At one time the path leading to the Battalion Headquarters of the Infantry we were covering led along the railway, and I could stand and gaze over a screen across "No Man's Land," to where the railway reached the German lines, and reflect that on this section of the line, now desolated, I had in days gone by, seen some of the finest locomotive work in the world.

After the Germans' more or less voluntary retirement, and before the Battle of Arras (April 9, 1917), an engine used occasionally to come up to Arras from St. Pol, but after the advance consequent upon the battle, railway traffic on a fairly large scale was soon resumed, a single line

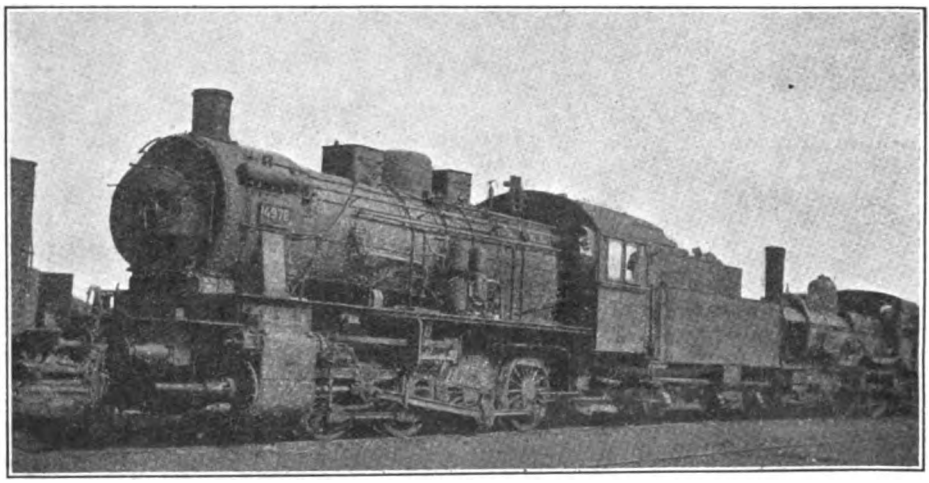


Photo.] GERMAN 0-8-0 AND OLD FRENCH 4-4-0 ENGINES. [*Lord Monkswell.*

Digitized by Google

being open for some distance beyond Arras in the direction of Douai. The line from St. Pol to Arras had never been sufficiently damaged to make the resumption of railway traffic right into Arras a matter of much difficulty, but the line from Doullens, running, as it does, for some distance along a ridge, where the German guns had easily reached it, wanted a good deal of repairing, which, however, was soon accomplished. The main line towards Paris, many miles of which had been held by the Germans almost from the beginning, was, of course, very badly knocked about and took much longer to get into working order.

The traffic in and out of Arras was principally worked by British locomotives. The engines came from various companies, but I saw more 0-6-0 Lancashire and Yorkshire engines with eight-wheel tenders, than any other kind, though at a goods yard on the line to Doullens, only some ten miles away, I one day counted eleven Great Eastern 0-6-0 engines.

After some time in the suburb of Achicourt, the battery position was changed for one just east of the railway and within a hundred yards of the large semi-circular running shed. This being very conveniently close to the drivers' and firemen's dormitory, the officers' mess was installed inside the big room on the ground floor, and the officers mostly passed the night in a large cellar on the side of the building remote from the Germans, which offered a very considerable degree of protection against shells. This cellar turned out most useful one Sunday. All preparations had been made for holding a service at 11 a.m. The chaplain had arrived, and all the available men in the battery had been warned to attend. Then, just about 10.45 the Germans began shelling a big water tower about 50 feet beyond our building, and continued shelling with much thoroughness for the next two hours, most of the shells that fell short of their mark finding our building instead. All idea of holding a service, of course, had to be given up, and everyone hastily retired to the cellar which sheltered us so well that at the end of their shoot the Germans had failed to inflict the least wound upon any one, though they had certainly damaged the water tower, and had also smashed up most of our mess utensils.

The best way into Arras was to walk down the line as far as the station, some half-mile; this was particularly the case if the weather was wet, for the ballast was always clean while the roads were almost always filthy. The station buildings, though battered, were still standing, but of the acre or so of glass in the roof, there was hardly a pane intact, and it lay, broken up into small pieces, thickly strewn over the platforms and permanent way, rather like hail lies after a sharp hailstorm.

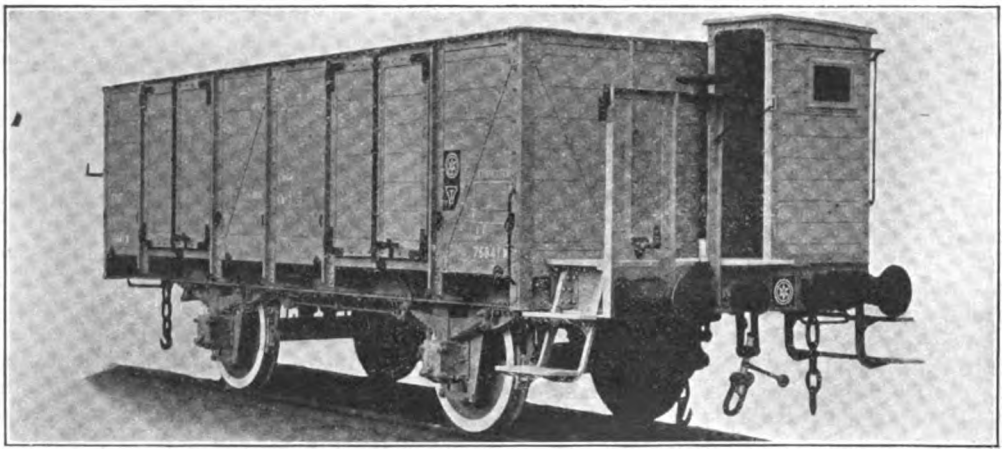
When near Arras, I was on one occasion given four days' leave to Paris. I knew nothing about the times of the trains, but started off prepared, if necessary, to begin by riding twenty miles to Doullens. Inquiring at the office at Arras station on the way, I was much gratified to hear that an empty goods train for Doullens, Longpré and beyond was shortly going to start, so I got rid of my horse, and seating myself in a covered goods van, was soon being carried towards Doullens behind two 0-6-0 engines, one belonging to the Midland and the other to the Great Western. On the way we passed within a hundred yards of what had, the previous autumn, been the observation post of the battery to which I belonged, now a long way from the battle front. At Doullens, we ran by one leg of a triangle into the new yard constructed for the uses of the war, and, after detaching our two British engines, started off again in the reverse direction over the other leg of the triangle behind a big Nord 0-6-2 : 2-6-0 tank engine. From Doullens to the Nord main line at Longpré, the line is double (except where it crosses the Somme valley on a viaduct, some 300 or 400 yards long). Before the war, it was a cross-country single line of no particular importance, remarkable chiefly for the severity of its gradients. The doubling of the line was not exactly a simple matter, though it was successfully carried out quite early in the war, but the reduction of the gradients was an impossible task, and was not attempted. From Doullens to Candas, the summit I believe, the gradients are about 1 in 60, and they must be at least as steep on the subsequent descent. These steep banks, worked over by rolling-stock not always in the best condition, got at one time rather a bad name for accidents. I believe that once at least some wagons which broke loose on

Digitized by Google

this bank, ran back into Doullens station and collided with a train full of British officers and men about to start on leave, many of whom were killed or injured. I myself, on one occasion, saw half-a-dozen wagons lying in a field beside the line. To-night, however, though the speed fell to perhaps seven miles an hour on the steepest parts, the ascent took place without incident. At Longpré, I left the goods train, and had nothing to do but wait for the next train going to Paris, which, after an hour or so, turned up in the shape of a French leave train carrying perhaps a thousand men. A leisurely journey in this train safely landed me next morning in Paris.

Returning from Paris a few days later I travelled as far as Amiens in a train which was, I think, the longest passenger train I have ever seen. I had not time to count the carriages, but they stretched out so far beyond the platforms of the Gare du Nord that I could not make out where they came to an end. The train was full, mostly of French soldiers returning from leave. It must have contained not less than 2,500 people and weighed probably, 700 tons. As far as Creil we went by the roundabout line *via* Beaumont and thence to Amiens as usual. At Amiens, though I was in a carriage three or four from the end of the train, I had about a hundred and fifty yards to walk before I reached the platform. I found that the engine was No. 3·1165, a 4-6-2, which explains how it was that we had come along without any difficulty.

Journeys, when going on leave or returning from it, often provided very odd experiences, judged from a peace-time standard. In the winter of 1916 I started one morning from a place near Doullens, and arrived at 1 p.m. at Doullens Station, where I discovered that the leave train was expected at 2 a.m. After exhausting the rather meagre attractions of the town of Doullens during the afternoon and evening, I returned to the station after dinner at the hotel, and, for a number of hours, proceeded to pace the platform. Somewhere about midnight the station people told us that there was no hope of the leave train till next morning. (So far as I could gather, the arrangement at that time was to have one train constantly running between that part of the front on which we were and Boulogne, timed to do the round trip in 24 hours. As 24 hours never proved enough, the train gradually got later and later every day till a time arrived when, being really one complete day late, it had regained its punctuality, so far as its passengers on that one occasion were concerned.) So I wandered back into the town and, in a very small house which some unknown benefactor had hired and made into an officers' club, I was so fortunate as to find the remains of a fire and a bedstead made in the usual manner—of a stout wooden



FOUR-WHEELED HIGH-SIDED GONDOLA WAGON WITH BRAKE COMPARTMENT, BUILT FOR USE IN FRANCE.

Digitized by Google

frame with rabbit netting stretched across it—where I got a few hours' sleep. Eventually the leave train, which was due at 2 a.m., turned up at 3.35 p.m. and we got away, but the ninety miles or so to Boulogne took twelve hours. The approach to Abbeville was a fearful experience. In the last two or three miles there were said to be eight goods trains in front of us, and there was a fairly thick fog, so for several hours we hardly ever moved more than a quarter-of-a-mile at a time. To make up for this, after leaving Abbeville we ran for some distance at 65 to 70 miles an hour—very unusual experience in a journey performed at an overall speed of less than eight miles an hour.

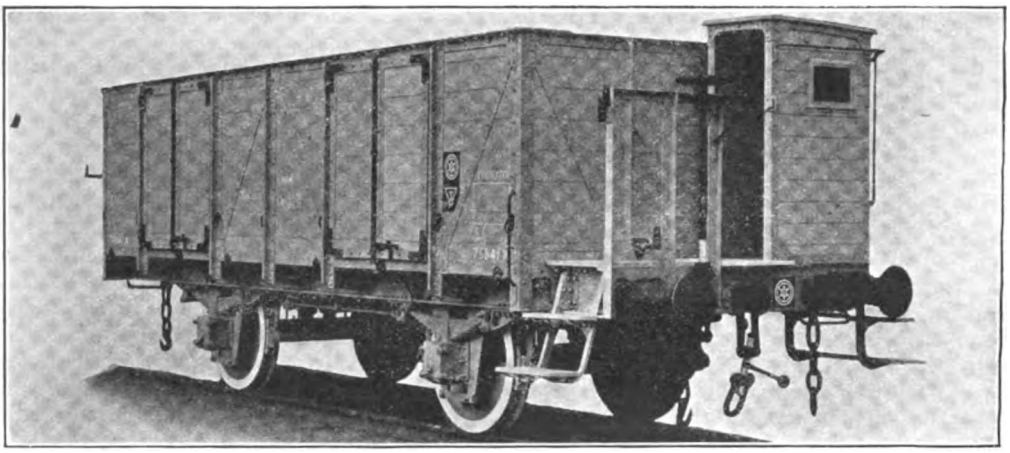
About ten days later my leave came to an end. So as to make the fullest use of the time I did not leave Norwich till 10.20 p.m. on the night immediately preceding my departure for France by an early morning train from Victoria. I reached Liverpool Street at 3 a.m., an hour at which I hope never to see that station again, and walked slowly across to Victoria, whence my train started at, I think, 6.50. After a night in Boulogne, I joined the return leave train and set out on another of those interminable journeys which the leave trains in France at that time provided. I left Boulogne at about 9 a.m. in a hugely long train packed with men. Many of the windows were broken and a door was missing here and there. As far as Longpré, while we were travelling on the main line, we got along fairly well, but when we got on to the steep gradients approaching Candas summit, our troubles began. In at least one place we came for a time to a dead stop, because the engine could not pull the train any further. This was not due to any fault of the engine, but to the fact that some of the brakes, being probably in urgent need of overhauling, kept leaking on. The ones under the carriage in which I was travelling were particularly bad offenders, and could not be released at all; the blocks got so hot that for a long time my compartment was full of the smell of hot metal. In the final struggle up to Candas Station the train did not actually stop, but the speed fell to about three miles an hour. At Doullens such of us as were going to Arras transferred ourselves to an empty covered goods van which, together with a few more nondescript vehicles, was slowly to make its way to Saulty, the last station at that time open on the way to Arras. This was, I think, absolutely the slowest journey I have ever known. For the eleven miles we took somewhere about four hours. It was clear and bitterly cold, and by morning, when we emerged from a Y.M.C.A. hut at Saulty, which sheltered us for the night, it was snowing.

The next time I went on leave I started from St. Pol and got from there to Etaples comfortably enough in a first-class carriage, with only the proper number of passengers in it. We reached Etaples at midnight. It was a fine night, but extremely cold. My first refuge was a Y.M.C.A. hut, where hot cocoa could be procured, of which I was very glad; but, though the hut was crowded, the night was so very cold that I was eventually frozen out of the hut and returned to the station. Here I joined a small group which had found a fire in the lamp room, where, however, it was necessary to take extreme care, neither to lean against, nor touch anything. And so the night wore on till at 6 a.m. a train for Boulogne appeared, in which I just contrived to find room in a corridor. The make-up of the train was what would, in ordinary times, have been that of a Paris–Boulogne *rapide*, and it was drawn by a 4-6-2 express engine. But the seventeen miles to Boulogne took three hours.

Returning to France I contrived this time to travel by the ordinary boat train, leaving Charing Cross at 1 p.m., instead of the return leave train which left Victoria in the early morning. After a night in Boulogne, as usual, I started off again on my return to the front by a train which was, if possible, more crowded than the one in which I had travelled on the last occasion. After a very long slow journey, in the course of which several hundred men got out and walked beside the train up the Candas incline, we reached Frévent, and thence went on next morning by the light railway to Aubigny, which was then the station for Arras.

Digitized by Google

this bank, ran back into Doullens station and collided with a train full of British officers and men about to start on leave, many of whom were killed or injured. I myself, on one occasion, saw half-a-dozen wagons lying in a field beside the line. To-night, however, though the speed fell to perhaps seven miles an hour on the steepest parts, the ascent took place without incident. At Longpré, I left the goods train, and had nothing to do but wait for the next train going to Paris, which, after an hour or so, turned up in the shape of a French leave train carrying perhaps a thousand men. A leisurely journey in this train safely landed me next morning in Paris.



FOUR-WHEELED HIGH-SIDED GONDOLA WAGON WITH BRAKE COMPARTMENT, BUILT FOR USE IN FRANCE.

Returning from Paris a few days later I travelled as far as Amiens in a train which was, I think, the longest passenger train I have ever seen. I had not time to count the carriages, but they stretched out so far beyond the platforms of the Gare du Nord that I could not make out where they came to an end. The train was full, mostly of French soldiers returning from leave. It must have contained not less than 2,500 people and weighed probably, 700 tons. As far as Creil we went by the roundabout line *via* Beaumont and thence to Amiens as usual. At Amiens, though I was in a carriage three or four from the end of the train, I had about a hundred and fifty yards to walk before I reached the platform. I found that the engine was No. 3·1165, a 4-6-2, which explains how it was that we had come along without any difficulty.

Journeys, when going on leave or returning from it, often provided very odd experiences, judged from a peace-time standard. In the winter of 1916 I started one morning from a place near Doullens, and arrived at 1 p.m. at Doullens Station, where I discovered that the leave train was expected at 2 a.m. After exhausting the rather meagre attractions of the town of Doullens during the afternoon and evening, I returned to the station after dinner at the hotel, and, for a number of hours, proceeded to pace the platform. Somewhere about midnight the station people told us that there was no hope of the leave train till next morning. (So far as I could gather, the arrangement at that time was to have one train constantly running between that part of the front on which we were and Boulogne, timed to do the round trip in 24 hours. As 24 hours never proved enough, the train gradually got later and later every day till a time arrived when, being really one complete day late, it had regained its punctuality, so far as its passengers on that one occasion were concerned.) So I wandered back into the town and, in a very small house which some unknown benefactor had hired and made into an officers' club, I was so fortunate as to find the remains of a fire and a bedstead made in the usual manner—of a stout wooden

Digitized by Google

frame with rabbit netting stretched across it—where I got a few hours' sleep. Eventually the leave train, which was due at 2 a.m., turned up at 3.35 p.m. and we got away, but the ninety miles or so to Boulogne took twelve hours. The approach to Abbeville was a fearful experience. In the last two or three miles there were said to be eight goods trains in front of us, and there was a fairly thick fog, so for several hours we hardly ever moved more than a quarter-of-a-mile at a time. To make up for this, after leaving Abbeville we ran for some distance at 65 to 70 miles an hour—very unusual experience in a journey performed at an overall speed of less than eight miles an hour.

About ten days later my leave came to an end. So as to make the fullest use of the time I did not leave Norwich till 10.20 p.m. on the night immediately preceding my departure for France by an early morning train from Victoria. I reached Liverpool Street at 3 a.m., an hour at which I hope never to see that station again, and walked slowly across to Victoria, whence my train started at, I think, 6.50. After a night in Boulogne, I joined the return leave train and set out on another of those interminable journeys which the leave trains in France at that time provided. I left Boulogne at about 9 a.m. in a hugely long train packed with men. Many of the windows were broken and a door was missing here and there. As far as Longpré, while we were travelling on the main line, we got along fairly well, but when we got on to the steep gradients approaching Candas summit, our troubles began. In at least one place we came for a time to a dead stop, because the engine could not pull the train any further. This was not due to any fault of the engine, but to the fact that some of the brakes, being probably in urgent need of overhauling, kept leaking on. The ones under the carriage in which I was travelling were particularly bad offenders, and could not be released at all; the blocks got so hot that for a long time my compartment was full of the smell of hot metal. In the final struggle up to Candas Station the train did not actually stop, but the speed fell to about three miles an hour. At Doullens such of us as were going to Arras transferred ourselves to an empty covered goods van which, together with a few more nondescript vehicles, was slowly to make its way to Saulty, the last station at that time open on the way to Arras. This was, I think, absolutely the slowest journey I have ever known. For the eleven miles we took somewhere about four hours. It was clear and bitterly cold, and by morning, when we emerged from a Y.M.C.A. hut at Saulty, which sheltered us for the night, it was snowing.

The next time I went on leave I started from St. Pol and got from there to Etaples comfortably enough in a first-class carriage, with only the proper number of passengers in it. We reached Etaples at midnight. It was a fine night, but extremely cold. My first refuge was a Y.M.C.A. hut, where hot cocoa could be procured, of which I was very glad; but, though the hut was crowded, the night was so very cold that I was eventually frozen out of the hut and returned to the station. Here I joined a small group which had found a fire in the lamp room, where, however, it was necessary to take extreme care, neither to lean against, nor touch anything. And so the night wore on till at 6 a.m. a train for Boulogne appeared, in which I just contrived to find room in a corridor. The make-up of the train was what would, in ordinary times, have been that of a Paris–Boulogne *rapide*, and it was drawn by a 4-6-2 express engine. But the seventeen miles to Boulogne took three hours.

Returning to France I contrived this time to travel by the ordinary boat train, leaving Charing Cross at 1 p.m., instead of the return leave train which left Victoria in the early morning. After a night in Boulogne, as usual, I started off again on my return to the front by a train which was, if possible, more crowded than the one in which I had travelled on the last occasion. After a very long slow journey, in the course of which several hundred men got out and walked beside the train up the Candas incline, we reached Frévent, and thence went on next morning by the light railway to Aubigny, which was then the station for Arras.

Digitized by Google

A Modern Railway Goods Station in Manchester.

OLDHAM ROAD, LANCASHIRE & YORKSHIRE RAILWAY.

By CHAS. S. LAKE, A.M.I.Mech.E.

OLDHAM Road Goods Station, situated in the north-eastern district of Manchester, was originally constructed in 1839 as the terminus of the Manchester and Leeds Railway, which system was opened throughout for passenger and goods traffic on March 1, 1841. This subsequently amalgamated with several others, namely the Ashton, Stalybridge and Liverpool Junction Railway (1844), the Wakefield, Pontefract and Goole Railway (1845), Huddersfield and Sheffield Junction Railway (1846), West Riding Union Railway (1846). In the following year, namely, 1847, the Manchester and Leeds Railway with its previous amalgamation was reconstituted as the Lancashire and Yorkshire Railway Company, which subsequently absorbed the East Lancashire Railway and the Barnsley and West Lancashire Railways among others.

In 1844 the Manchester and Leeds Railway Company constructed a new passenger station in Manchester known as Victoria, thereupon relegating the Oldham Road premises to form a goods depôt, the passenger station, as such, being closed with the opening of Victoria. At that time the station was, judged by present standards, one of small capacity. Its growth to the existing status was a gradual one, more accommodation being constantly required, leading up to the most recent extension scheme, put in hand in the year 1913, and completed, with the exception of one small section, in 1916. The last scheme had as its effect the practical remodelling of the whole station, affording accommodation for 250 additional wagons.

Traffic Dealt with and Area Served.

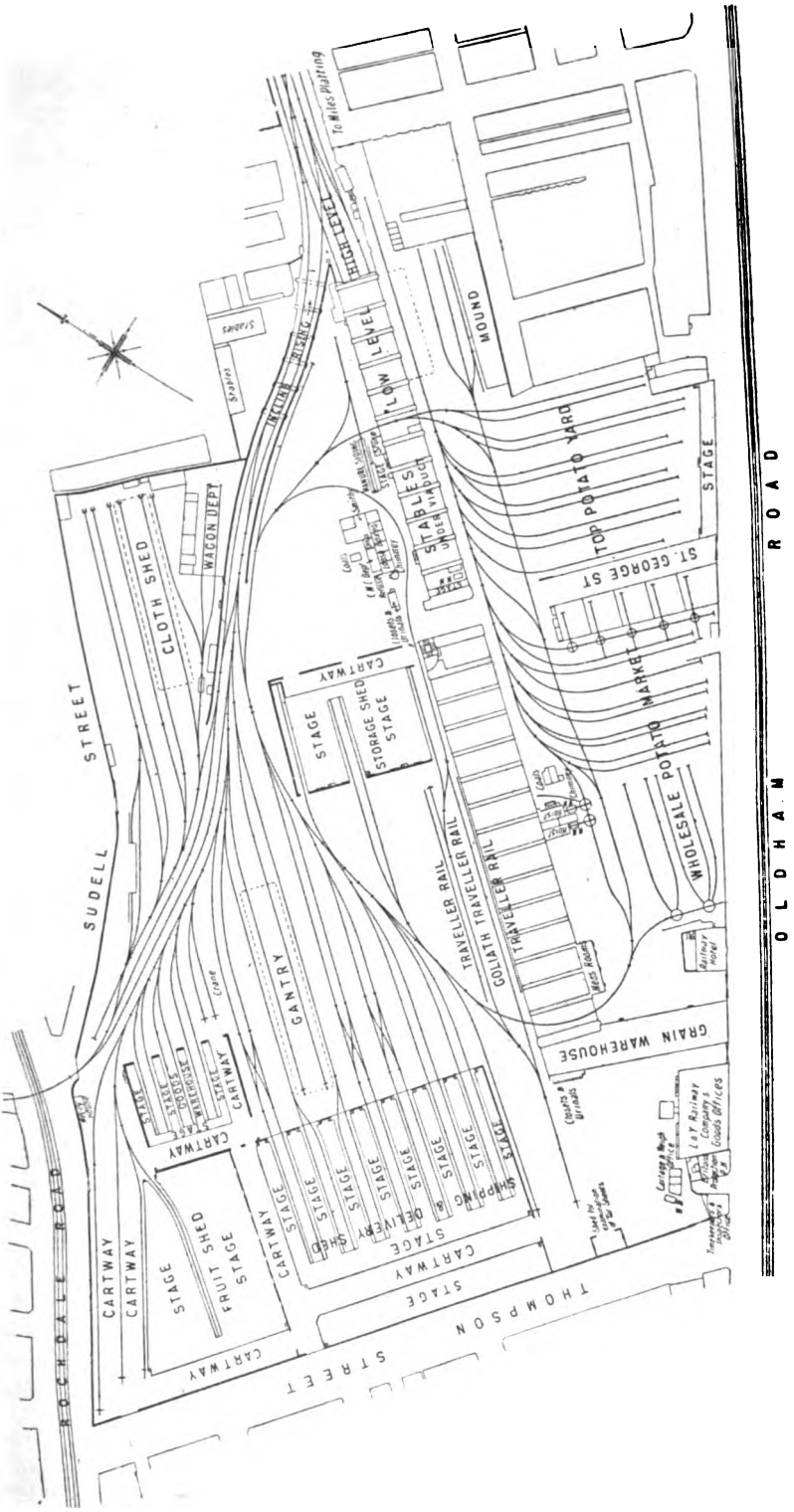
From its geographical position in regard to other railways, the depôt at Oldham Road is especially intended to serve, for general goods traffic, the east and north-east parts of Lancashire, the whole of Yorkshire and the districts served by the North Eastern Railway as well as the East Coast ports of Goole and Hull and those on the Rivers Tyne and Tees. It is also adapted for dealing with potato traffic on a very large scale, and indeed it constitutes the principal depôt in the North of England for the distribution of this commodity. A large proportion of the inward traffic for the Manchester district from Scandinavia and Denmark, and their connections with Russia, Finland, &c., is dealt with through the Oldham Road Station.

In the new extension in 1913 special provision was made for handling fruit and vegetables and provision traffic for the wholesale markets of Manchester, which are close to Oldham Road, the fruit and vegetable traffic being principally from Yorkshire and Holland, and the provision traffic from Dutch, Scandinavian and other sources. This depôt then, as indicated above, serves the east and north-eastern parts of England, involving a very considerable area, while the whole of the traffic in connection with the western portion is served by the Salford Depôt belonging to the same railway, in both cases working in conjunction with other railways operating north of the system. Thus the northern part of the Kingdom is, as it were, divided into two main sections where the Lancashire & Yorkshire Railway is concerned, Oldham Road dealing with the east and Salford with the west In the present article we are concerned with the eastern area only, namely, that dealt with, so far as Manchester is in question, through Oldham Road.

The Recent Extensions.

The area of the complete station as at present existing is 23¼ acres, of which 9 acres are covered by buildings. The

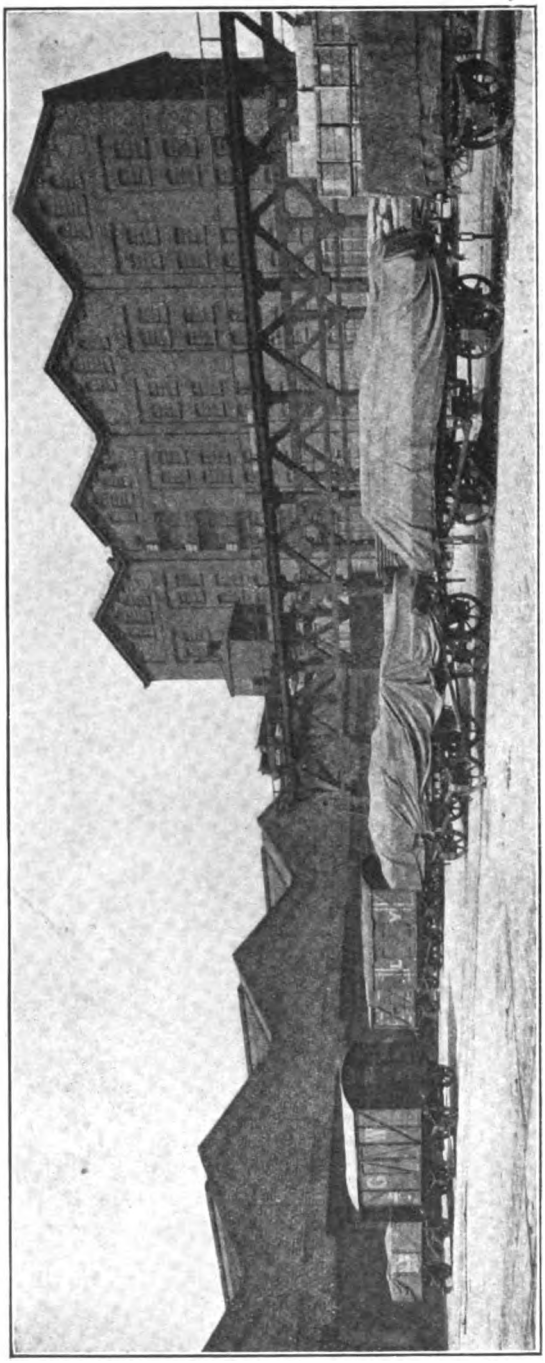
Digitized by Google



PLAN OF OLDHAM ROAD GOODS DEPOT AS NOW COMPLETED.

Digitized by Google

total track mileage in the goods yard, including the incline and high level line (to which further reference will be made), to the junction with the incline is 8¼ miles.



ENTRANCE TO NEW SUNDRY SHED, SHOWING STEAM GANTRY AND LEES STREET STORAGE WAREHOUSE.

The enlargements put in hand in 1913 comprised the erection of an entirely new block of offices, including superintendent's, clerks', inspectors' and time offices, a new general shed for dealing with received and forwarded goods, capable of accommodating 120 wagons, and a new shed for dealing with home and imported fruit and provision traffic. The office block presents a striking appearance with a frontage on the main thoroughfare known as Oldham Road, and the offices within it are noteworthy for their excellent arrangement, both collectively and individually, the respective rooms being well lighted and ventilated and in all respects adapted for their purpose, due regard having been paid to the comfort and convenience of the staff.

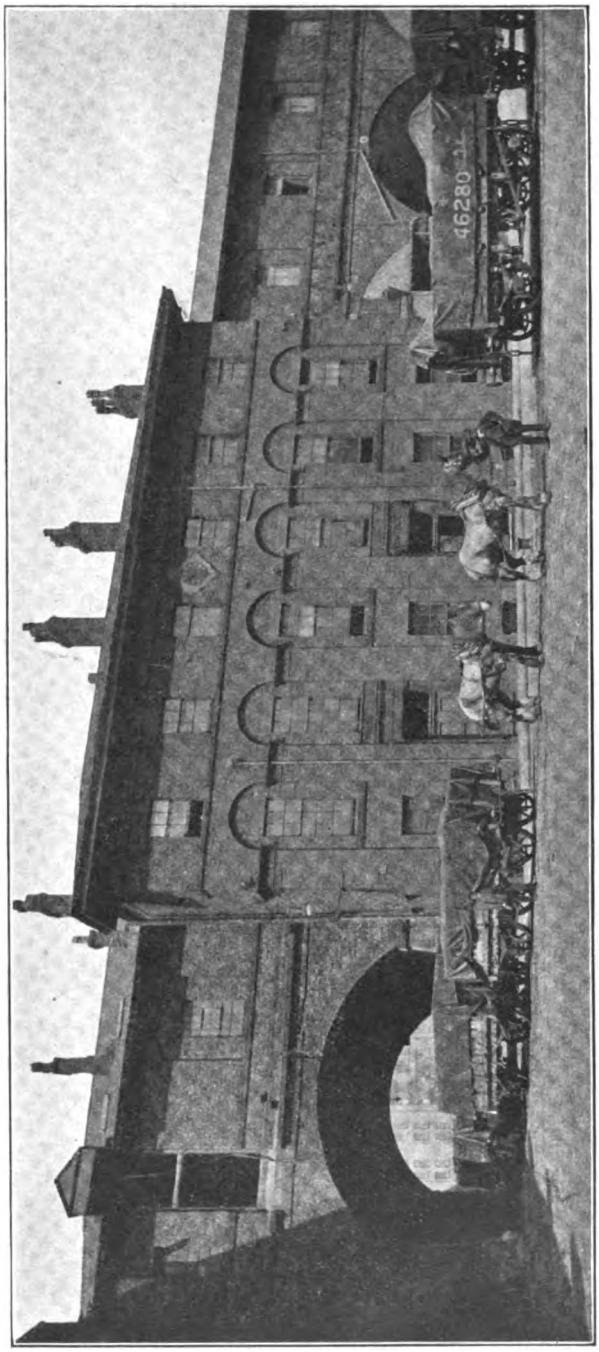
Remodelling the Track Lay-out.

The yard accommodation as reconstructed includes the instalment of a Goliath travelling crane of 20-tons lifting capacity, and an entire remodelling of the track lay-out, the conversion of the old shipping and delivery shed into a storage building, and the roofing over of an open potato yard, which covers an area of 2¾ acres. The depôt is approached by rail by a branch line for goods traffic only from the main line at a point between Victoria and Miles Platting Stations, the branch line being laid with four tracks throughout. The road approaches to the depôt are from Oldham Road and Rochdale Road, the two principal northern arteries to and from the city of Manchester.

In dealing with the general arrangement of the buildings and their equipment, and also the method of operation followed, we may take as a starting point the branch line of the high level along which trains are worked from Miles Platting. The junction is about 20 ft. above the general level of the station, and the wagons gravitate into the yards on an incline,

Digitized by Google

having a steepest gradient of 1 in 27. and a total length of about 180 yards. The numbers of wagons per trip is 25 loaded and 30 empty, with engine attached, but when gravitating without an engine the trains comprise 10 loaded and 20 empty wagons. The trains of wagons are distributed by shunting engines to the various sheds or sidings, in other words, from all points within the area of the station except the wholesale potato yard. The high level lines practically have the effect of dividing the station into two sections, the traffic on the north side being operated by shunting engines, and a portion of that on the east side by means of capstans and turntables. As soon as circumstances permit the wholesale potato yard will be altered to allow of direct shunting into the positions required for the wagons by locomotive and capstan power.

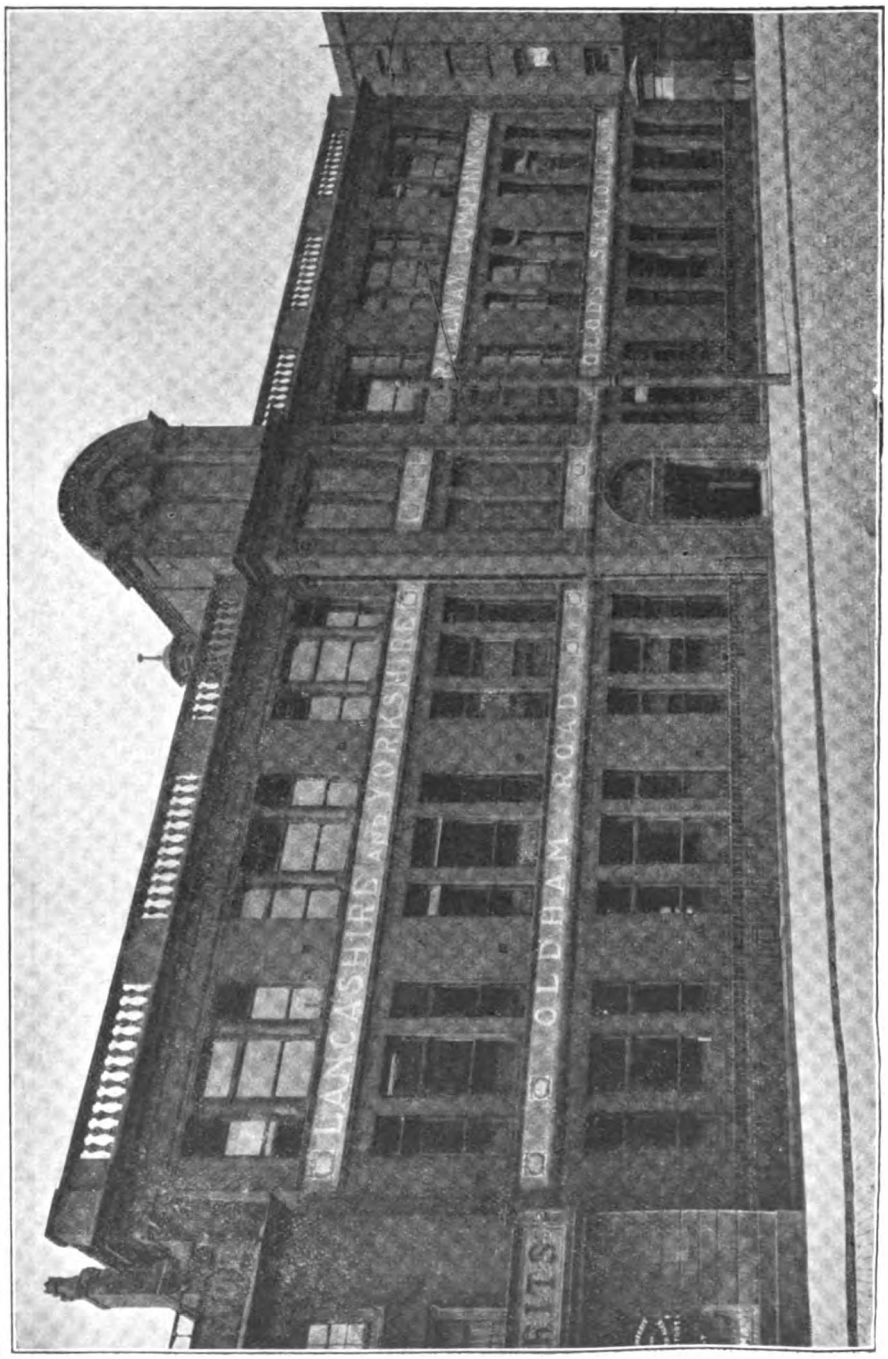


CIRCULAR RAIL TRACK TO POTATO YARDS, AND OLD OFFICES AND STATION OF THE ORIGINAL MANCHESTER AND LEEDS RAILWAY, NOW CONVERTED TO MESS ROOMS FOR OUTSIDE STAFF.

Reduction of Wagon Hoists.

Under the old system of wagon distribution the only means of access to the eastern side of the yard was by means of a wagon hoist which was used for raising and lowering the vehicles from the high to the low level and *vice versa*. This involved a period of 3½ mins. for each operation, *i.e.*, raising one wagon and lowering another, and was a tedious and wasteful process. As will be seen in the plan showing the yard as at present operated, a circular rail track has been provided from the high level incline passing entirely through the two potato yards and giving access to the whole of the lines running into the sheds. Shunting engines are employed in moving the traffic over this circular track and an access road leading directly to the shed, thus forming a complete system of inter-communication

Digitized by Google



NEW GOODS OFFICES ON OLDHAM ROAD.

Digitized by Google

between any one point and another within or without the sheds.

Reduction of Turntables.

The further advantage of the scheme is realised when it is pointed out that under the old arrangements every wagon going into the old delivery and shipping shed had to be turned on two turntables, a process necessarily involving an excessive amount of time and labour. The numbers of turntables in use before the alterations were carried out was 10 on the high level and 83 on the low level, a total of 93, whilst 40 capstans were employed. When the alterations are finally completed the turntables will be reduced to 19 in number and the capstans to 15.

The shed, as originally laid out, had accommodation for 54 wagons, and, taking a day's work at about six times this number, we get 1,248 separate turntable movements per diem. As a contrast to this each of the sidings of the new shed which supplants the old one for this purpose can be filled or emptied in one operation of the shunting engine. Each siding holds eight or nine wagons and can obviously be dealt with, if necessary, as one shunt. The old station had 9 ft. 6in. diam. turntables, but the new ones will be of an up-to-date character capable of taking wagons with the standard 11 ft. wheelbase.

Electrically Operated Mechanical Appliances.

The plan on page 9, for the original of which we are indebted to Mr. D. C. Rattray, Chief Engineer of the Lancashire and Yorkshire Railway, who was responsible for the lay-out of the yards and buildings, shows that the three tracks on leaving the incline spread out into 28 roads, 14 of which give direct access to the new shipping and delivery, or, as it is termed, the sundry shed, which latter is capable of accommodating 120 wagons of different kinds in seven bays, each of which is served by two roads. This is a very modern building equipped with up-to-date electrically-operated mechanical appliances. The area of the shed is 10,772 sq. yards. Each span is served by an electric overhead travelling crane of 30-cwt. capacity, travelling at a speed of 380 ft. per minute under full load and 180 ft. for lifting and traversing combined. These cranes are of an entirely modern type, made by the firm of Royce, Limited, of Trafford Park, Manchester, these as well as the other electrical and mechanical equipment being installed in accordance with the designs of the Chief Mechanical Engineer of the Lancashire and Yorkshire Railway, Mr. George Hughes.

Each span in the building measures 39 ft. 2 in. in width by 200 ft. long, with the exception of one, which has a width of 51 ft. 10 in. The building is solidly constructed in brick, the roof being supported on steel girders forming runways for the overhead travelling cranes, these runways being in turn mounted on vertical steel columns, which latter follow a line representing the centre of each stage, so that in all cases individual cranes serve the two roads of the bay below and half of the stage on each side.

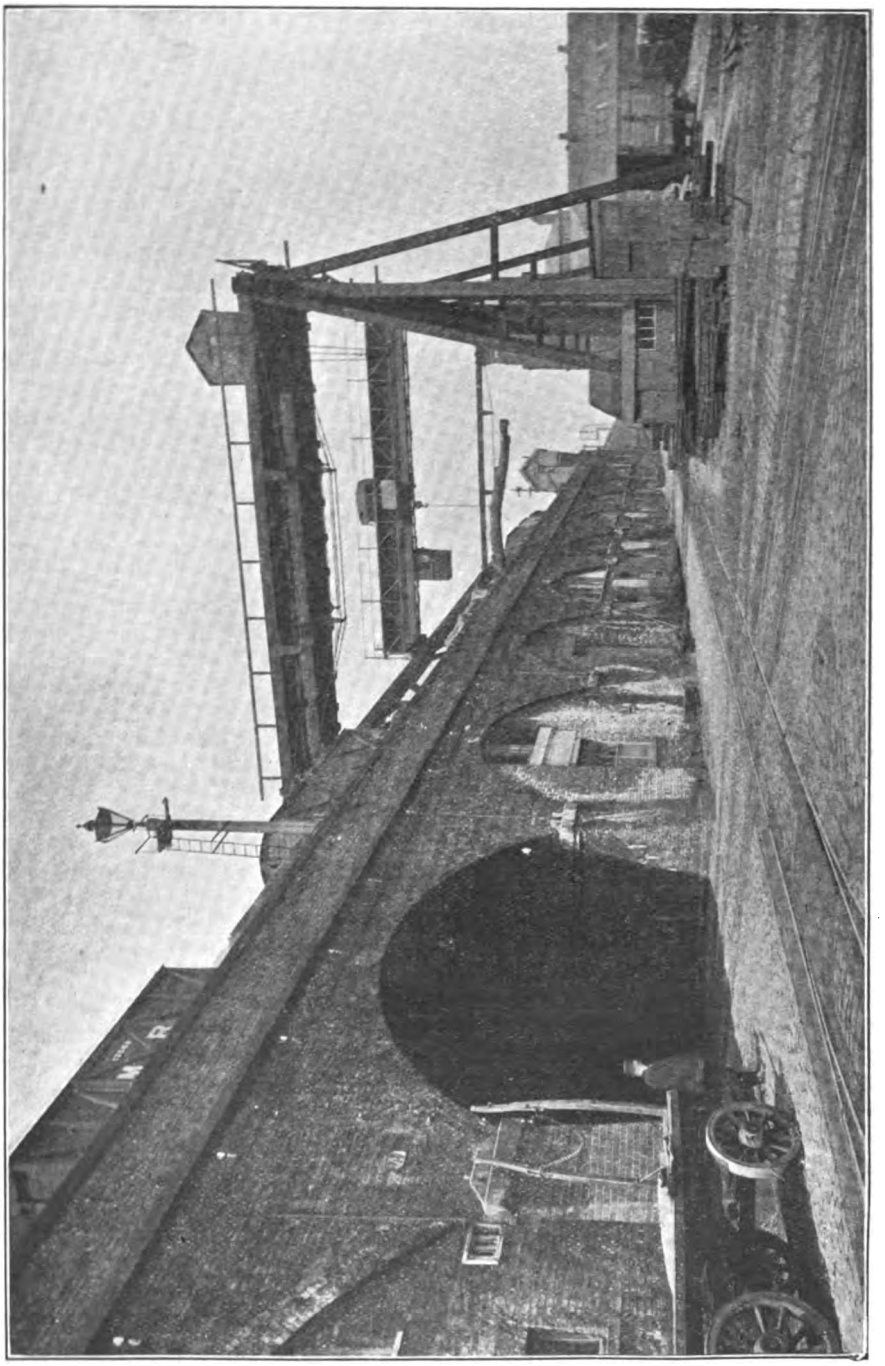
Disadvantages of a "Through" Shed.

A feature of the shed is that each of the stages served by the separate roads is connected up as it were by a communication stage or landing, running transversely across the building at the inner end, so that a dual means of intercommunication is afforded between the whole of the stages. Thus, goods unloaded on the extreme east side of the shed can be transferred, if necessary, to the extreme west side at the same level. A very considerable saving of time is effected by the use of electric platform trucks, four of which are in constant use in the sundry or shipping shed and in the fruit shed. These are of the Elwell-Parker type, and work in conjunction with a number of trailers and flat-bottomers or containers. The electric trucks collect goods from alongside the wagons at any of the stages and quickly transfer them to the drays. The cranes and hand-trucks supplement the work performed in this connection.

Inwards and Outwards Working.

The shed is common to both delivery and forwarding work, and the reverse operation takes place in the handling of goods between hand and rail. Work is commenced within the shed at 4 a.m. daily, with a separate staff for delivery work until 1.30 p.m. The forwarding

Digitized by Google



5-TON ELECTRIC OVERHEAD CRANE OPERATING OVER BOTH HIGH AND LOW LEVELS.

Digitized by Google

staff comes on duty at 1 p.m., working through until 10.30 p.m., the hours on Saturdays being 4 a.m. to 10.30 a.m. for delivery, and 8.30 a.m. to 2 p.m. for forwarding. The loading berth for each allocated station is plainly indicated by a board, on which is painted in large characters the name of the station to which goods are to be loaded. The wagons discharged in the morning with inward goods are utilised for outward loading.

The average handling of the goods in the shed under normal conditions is 3,000 tons inward and 3,500 tons for outward traffic weekly, this being of a purely miscellaneous character; the individual consignments rarely exceeding 15 cwt. as a maximum. Although it would be difficult to analyse the nature of the goods handled, owing to their great variety, it is correct to state that the goods for which Manchester is famous, as a distributing centre, including cotton, cloth, light machinery and foodstuffs, provide the principal traffic.

Fruit and Provisions Shed.

The fruit and provision shed immediately adjoins the sundries or shipping shed. This accommodation has been provided to deal with a large volume of butter, bacon and eggs imported from North Europe *via* East Coast ports, as well as other foodstuffs, including case and canned goods from Canada and United States. This shed is served by four tracks, one of which penetrates the centre of the stage. Another one runs alongside it, and the two remaining ones enter the buildings although not alongside stages. One overhead electric crane of 2-tons capacity is available, this serving the track in the centre of the stage, the crane lifting and discharging on either side of the track. The weight of goods dealt with in this warehouse is, under normal conditions, between 2,000 and 3,000 tons. The Elwell-Parker electric trucks are also used to great advantage in this portion of the depôt.

Warehouse Accommodation.

The Lees Street warehouse derives its name from the fact that its entrance was from the street referred to, which formed the boundary of the depôt premises prior to the recent extensions. It is now utilised as a storage warehouse and is of large proportions, comprising a basement with six floors above and is devoted to the storage of heavy merchandise. The total floor area is 10,895 sq. yards, this including the five upper floors and the stages on the ground floor.

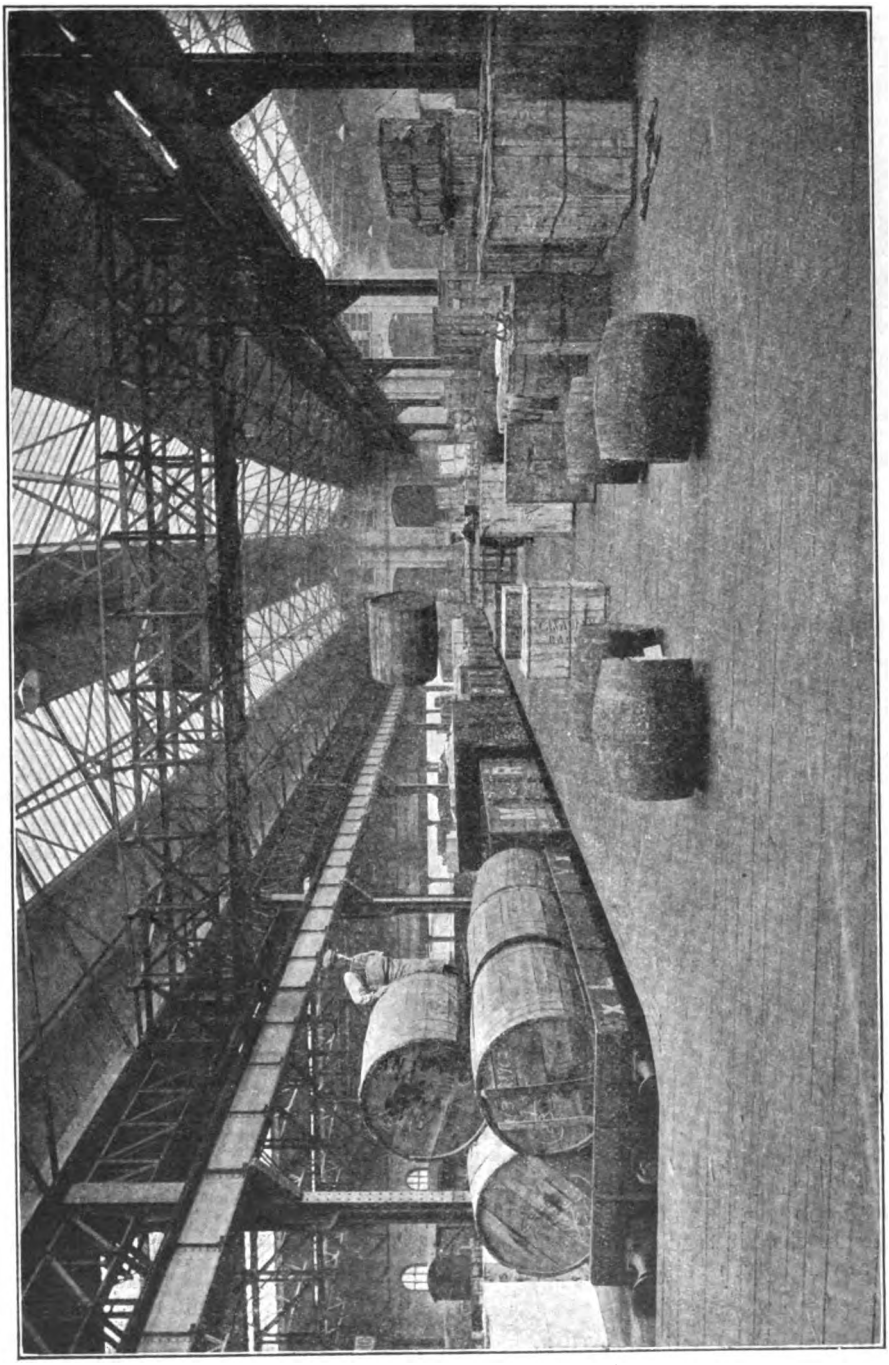
Appliances for Heavy Traffic.

The facilities for dealing with heavy traffic in the yard comprise a gantry spanning two tracks and carrying two steam operated overhead travelling cranes, each of 10-tons capacity, with a runway on the gantry of 270 ft. and a span of 50 ft. Wagons are deposited below the cranes by shunting engines and the loads transferred to and from drays and the railway wagons by the cranes. The traffic dealt with by the gantry consists of ironwork, girders, heavy cases and pieces of machinery, and largely of full loads of manufactured cotton goods loaded upon flat-bottoms, these flats or trays being similar in construction to the platform of an ordinary dray. The goods are sent to the mills where cloth is woven, the load of cloth being built up on the flat. It is then transferred in bulk by overhead cranes to the wagons, and on arrival in Manchester is again loaded by overhead cranes bodily without break of bulk on to a dray which takes it out for delivery to the merchant. This process ensures that goods loaded at the mill are delivered to the merchant without any intermediate handling, considerable economy being effected by this method. Whilst the use of the flat-bottoms is principally confined to loads of cloth, it is also resorted to for other commodities which can safely and securely be carried by this means.

In the new extension additional crane power was provided by the erection of an electric Goliath travelling crane 48 ft. in width. This was supplied by Stothert & Pitt, Limited, of Bath, and is situated near the high level alongside which it runs. The traffic dealt with under this crane is identical with that handled by the steam crane.

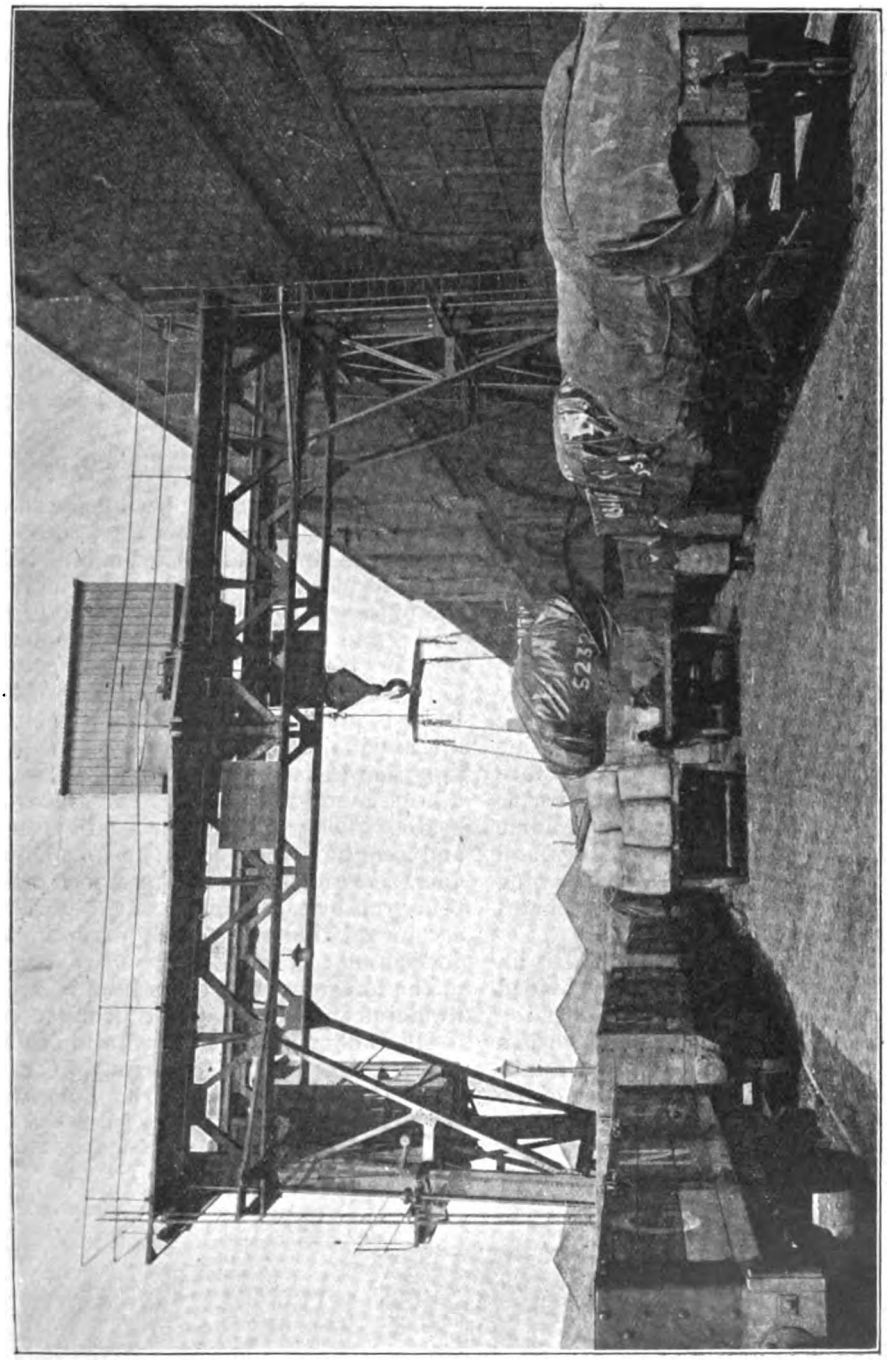
The old shed, formerly devoted to shipping and delivery work, has been remodelled and now forms a storage shed with an area of 3,513 sq. yards. Access to this shed is provided by four railway

Digitized by Google



STAGE AND CRANE IN NEW FRUIT AND PROVISION SHED.

Digitized by Google



NEW ELECTRIC GOLIATH 20-TON TRAVELLING CRANE.

Digitized by Google

tracks. The shed is devoted to the storage of general goods traffic.

Accommodation for Potato Traffic.

No description of Oldham Road Goods Station would be complete without reference to the unique position it occupies in respect of the potato trade. The accommodation provided, as the plan shows, comprises two extensive yards. What is known as the top potato yard has, under the new scheme, been completely roofed in over an area of 6,212 sq. yards. This section provides accommodation for 110 wagons under cover, and access is obtained by direct railway tracks, the wagons being shunted by locomotives from the circular main track.

Under the old scheme the wagons were moved by horse-power, the accommodation being 85 wagons, each of which had to be moved over two and sometimes three turntables as access to the yard could only be obtained by hoists from the high level. The lower potato yard is better described as the Wholesale Potato Market, the railway company being in agreement with the Manchester Corporation for the exercise of market privileges in this yard, to which latter traders come direct to make their purchases in the same way as in the public markets. The potato season usually extends from September to June, although there is a smaller volume of trade during the months of July and August. The weight of traffic passing through the two yards approximates 50,000 tons per annum.

Adjacent to the top potato yard is an overhead electric crane, specially provided for round timber, girders, &c. Under the old scheme twin bolster wagons, or girders on long wagons, could not be worked into position for unloading in this section of the yard, and the overhead electric crane was consequently erected to afford facilities for discharging wagons on the high level and depositing loads on the ground or on drays at the low level. The crane has a capacity of 5 tons, with a length of travel of 140 ft. and span of 52 ft., and with the aid of the circular railway track it is now possible to place wagons under the crane on the ground level.

The Grain Warehouse, situated at the entrance to the Wholesale Potato Market, is used for the storage of cereals, and access is secured thereto from the high level. Stabling accommodation is provided for 280 horses, the normal stud being 250, and the present one, depleted by the war, 198. There are 400 horse drays in use and two Leyland 4-ton petrol motor lorries.

Offices and Clerical Staff.

Reference has already been made to the new office building. This was erected as part of the new scheme, the building being ready for occupation in 1914. It includes the office of the Agent, Mr. J. H. Lightbown, and others for the accommodation of the clerical staff, numbering 140. Communication between each of the three floors is provided by means of an electric lift, and in designing the building adequate provision was made for staff increases over a large number of years. The offices are heated by a low-pressure hot-water system and ventilated by suction fans. Dining and recreation rooms are provided, these being run by a committee of the staff, the accommodation being really exceptionally good in all respects.

The foregoing article has been compiled from information obtained from a visit to the Oldham Road Goods Station by the courtesy of Mr. H. Marriott, C.B.E., Chief Goods Manager of the Lancashire and Yorkshire Railway.

Digitized by Google

Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. IX.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

IN 1893 all the three main lines competing for Scotch traffic, including, of course the Midland, started to run third-class dining cars on the afternoon expresses. The Midland train left St. Pancras at 1.30 p.m., and reached Carlisle at 8.5 p.m. In 1894 it was altered to leave St. Pancras at 2.10 p.m., travelled *via* Nottingham, arriving at Carlisle at 8.55 p.m., a timing maintained until the close of the nineteenth century. Subsequently this train reverted to the original 1.30 p.m. departure. The next step was the spread of the dining car disease (this, of course, from an engine driver's and not a passenger's point of view) to the morning Scotch trains, as a result of which, Normanton lost its pristine glory. It had only one, viz., the palatial refreshment rooms, devoted for many years to the good Samaritan's task of filling up the insides of passengers to and from Scotland. To one like myself, who knew these dining rooms in their days of prosperity, a visit to them now is a depressing experience, a sight something of the nature of the Sahara desert furnished with a beer pump. But outside Normanton station the scenery is so exceedingly dreary that I recommend the traveller to make for the deserted rooms, where at least the light refreshments maintain the high standard of the Midland.

The timing of the 2.10 p.m. from London for several years was as follows :—

		p.m.	Speed.
St. Pancras ..	..dep.	2.10	
(Kettering pass 3.34)			51·9
Nottingham ..	..arr.	4.33	
,, ..	..dep.	4.37	
Sheffield	..arr.	5.37	40·5
,, ...	..dep.	5.41	
Leeds	..arr.	6.29	49·4
,, ...	..dep.	6.34	
Hellifield	..arr.	7.19	48·75
,, ...	..dep.	7.22	
(Ais Ghyll Box pass 8.0)			49·2
Carlisle	..arr.	8.55	

The indifferent speed between Nottingham and Sheffield will be noted, and the time taken was 10 min. more than the best timing of the early eighties. Over this section there were only two roads until the beginning of the present century, and there was an interminable procession of coal trains, which always got in the way, since there was nowhere to get them out of it. Moreover, there were several places at which rigid speed restrictions owing to colliery workings had to be strictly enforced.

In 1897 the maximum speeds were as under, only those runs being given which differed from those in the preceding table.

	Miles.	Speed.
Bedford and Leicester	49½	50·3
Kettering and Nottingham ..	51¾	52·7
Leicester and Trent	20¾	*49·8
Sheffield and Nottingham ..	40½	†46·7
Sheffield and Normanton ..	28¾	50·7
Derby and Marple	48¾	‡46·5
Skipton and Carlisle	86¾	49·2
Derby and Manchester	62¾	44·8
Derby and Birmingham ..	42½	47·8
Leeds and Skipton	26	47·3

* Was 51 9 in 1890.
† Was 47·7, 1889 to 1892.
‡ Was 47·2, 1889 to 1892.

In 1897 the Midland started an innovation on the north to west service in the shape of dining car trains between Bradford and Bristol. The dining cars were independent of the kitchen car, which was a separate six-wheeled vehicle placed between them, so that the olfactory nerves of the passengers were not assailed by the smell of cooking. The up train left Bradford at 1.25 p.m. and the corresponding train in the opposite direction departed from Bristol at 2.5 p.m. The complete train under normal circumstances weighed about 155 to 160 tons, but was frequently increased to 220 tons. The timing of this train showed nothing remarkable in the way of speeds, as it put in too many

Digitized by Google

stops, which totalled to 52 min. between Bradford and Bristol. It kept up a steady 45 to 48 miles an hour average from station to station. Between Derby and Bristol it was worked by 7 ft. 6 in. singles.

In 1899 and 1900 the 10.30 a.m. Scotch (Glasgow) express was timed as under:—

		a.m.	Speed.
St. Pancras ..	..dep.	10.30	51·7
Leicester	..arr.	12.25	
,, ...	..dep.	12.30	45·5
Chesterfield ..	..arr.	1.32	
,, ..	..dep.	1.35	48·6
Skipton	..arr.	3.8	
,, ...	..dep.	3.12	48·2
Carlisle	..arr.	5.0	

This was very good running considering the difficulties of the Midland main line. From St. Pancras to Leicester it was worked by one of the 7 ft. 6 in. or 7 ft. 9 in. singles. Between Leicester and Skipton, the Nottingham 7 ft. 4-4.0 engines Nos. 2183 to 2192 and Nos. 156 to 160 usually worked it, though in 1900 Nos. 2421 to 2435 were frequently to be seen. From Skipton to Carlisle the 6 ft. 6 in. 4–4–0 engines Nos. 184 to 199 were employed.

Of the up trains from Carlisle, the 4.0 p.m. ex-Carlisle was perhaps the best. This train ran from Carlisle to Hellifield (due 5.35 p.m.) at 48·2 m.p.h., and thence to Leeds (due 6.24 p.m.) at 48 m.p.h.

Of the Manchester–London trains, those which ran during 1899-1900 in 4¼ hours deserve mention. Of these the 9.0 a.m from St. Pancras took the long route *via* Nottingham and Butterley as follows:—

		a.m.	Speed.
St. Pancras ..	..dep.	9.0	52·9
Kettering ..	..arr.	10.22	
,, ..	..dep.	10.26	52·6
Nottingham ..	..arr.	11.25	
,, ..	..dep.	11. 0	44·1
Marple	..arr.	12.51	
,, ...	..dep.	12.54	40
Manchester ..	..arr.	1.15	

The run from Nottingham to Marple included four severe junction slacks at Radford, Trowell, Codnor Park and Ambergate, also a long slack imposed by the engineering department near Langley Mill, and of course also included the long pull of 1 in 90 up to Peak Forest Tunnel, so that the 44 m.p.h. average was extremely creditable. The train was always worked between London and Nottingham by 7 ft. 6 in. singles and was frequently and in fact generally run from Nottingham to Manchester by the oldest 7 ft. 4–4–0 engines Nos. 1327 to 1346 built in 1877, although Nos. 205 to 209, 7 ft. 4–4–0 engines of 1897 occasionally worked it.

In 1900 the 12.0 noon from St. Pancras which ran *via* Leicester, was also a 4¼ hours train with stops at Kentish Town, Kettering, Leicester and Marple, and a conditional stop at Withington, which it rarely omitted.

The 4.15 p.m. up train from Manchester also had a 4¼-hours schedule with stops at Marple, Leicester and conditionally at Luton. The speed from Marple to Leicester was 48¼ m.p.h.

Another of the best trains was the 5.35 p.m. from Manchester, which ran through to Derby (*via* Stockport) at 47 m.p.h., and some of the best performances with it were made by old No. 165, the 2–4–0 engine of the old 800 class of 1870, which worked it during 1899-1900 in turn with other Leicester engines.

Finally, on the West road, one train only need be mentioned, viz., the 12.35 p.m. from Derby, worked through to Bristol by a 7 ft. 6 in. single. This train was timed in 1900 as follows:—

		p.m.	Speed.
Derby	..dep.	†12.35	51·75
Birmingham ..	..arr.	1.24	
,, ..	..dep.	1.30	46
Cheltenham ..	..arr.	*2.29	
,, ..	..dep.	2.33	35·5
Gloucester ..	..arr.	2.44	
,, ..	..dep.	2.48	45·3
Bristol	..arr.	3.37	

* This includes a short stop at Blackwell at the top of the Lickey incline.

† The distance from Derby to Birmingham was then 42¼ miles. Since 1905 it has been shortened by rather over a mile by means of the direct road from Kingsbury to Water Orton, which avoids the detour and curve at Whitacre Junction.

Towards the close of the nineteenth century I frequently noticed that the maximum speeds attained by the *older* engines showed a marked increase. As an example I give the following complete log of a run with engine No. 1563 in the early part of 1899, with the 2.0 p.m. Manchester express from St. Pancras. This engine was one of the 4–4–0 type built in 1882 with 6 ft. 9 in. wheels and 18 in. by 26 in. cylinders, and although it had been re-boilered in 1895, the new boiler carried only 140 lb. pressure and was

Digitized by Google

practically of the same size as the original one. The load was 160 tons.

			m.p.h.
St. Pancras	Dep.	1.59.50	
Camden Road	(Signal slack to 5 m.p.h., due to pass 2.3)		
Kentish Town ..	Pass	2.4.45	—
Childs Hill	,,	2.9.42	—
Hendon	,,	2.11.53	—
Post 9	,,	2.14.16	—
,, 10	,,	2.15.35	45·6
,, 11	,,	2.16.56	44·4
,, 13	,,	2.19.43	43·0
,, 14	,,	2.20.50	53·7
,, 15	,,	2.21.48	62·1
,, 17	,,	2.23.43	62·6
,, 18¼	,,	2.25.0	58·6
,, 19	,,	2.25.50	54·1
St. Albans	,,	2.26.55	—
Post 20	,,	2.27.5	48·0
21	,,	2.28.20	48·0
,, 22¼	,,	2.29.54	—
,, 23	,,	2.30.47	52·4
,, 25	,,	2.32.58	54·9
,, 26	,,	2.34.1	57·1
,, 27	,,	2.34.57	64·3
,, 28	,,	2.35.57	60·0
,, 29	,,	2.37.1	57·1
Luton	,,	2.38.14	—
Post 31½	,,	2.39.28	61·0
,, 32	,,	2.40.1	—
,, 33	,,	2.41.6	55·3
,, 34½	,,	2.42.40	—
,, 35	,,	2.43.8	59·0
,, 36	,,	2.44.3	65·5
,, 37	,,	2.44.55	69·2
,, 39	,,	2.46.33	73·4
,, 40	,,	2.47.20	76·6
,, 41	,,	2.48.8	75·0
,, 42	,,	2.48.57	73·4
,, 43	,,	2.49.46	73·4
,, 44¼	,,	2.50.45	76·0
,, 45	,,	2.51.21	75·0
,, 46	,,	2.52.7	78·3
,, 47	,,	2.52.52	80·0
,, 48	,,	2.53.39	76·6
,, 48½	,,	2.54.3	—
Kempston Road Junction	,,	2.54.50	—
Bedford North Junction	,,	2.55.15	—
Oakley Junction ..	,,	2.56.40	—
Oakley Station ..	,,	2.57.58	—
Sharnbrook Station	,,	3.1.40	—
Souldrop Signal Box	,,	3.3.40	—
Sharnbrook Summit	,,	3.6.25	—
Irchester	,,	3.9.28	—
Wellingborough ..	,,	3.11.32*	—
Finedon	,,	3.15.0	—
Isham	,,	3.16.23	—
Kettering	Arr.	3.20.0†	—

* Slackened here.
† Due 3.23.

The fastest mile, 46th to 47th posts, was done in 45 secs., a speed of 80 m.p.h. From post 34½ to post 48½, 14 miles, was covered in 11 min. 23 sec., an average speed of 73·7 m.p.h. From passing Kentish Town to the Kettering stop the average was 56¼ m.p.h., and to passing Wellingborough 57·1 m.p.h. So much time, however, was in hand at Wellingborough that the final 7 miles were run gently in 8 min. 28 sec., in spite of which we arrived nearly 3 min. to the good.

This was undoubtedly a brilliant performance for what is now a very small engine with only 140 lb. pressure with a load of 160 tons over a heavy road.

The above run was, however, not the only instance of one of the small engines putting up a fine performance. The same year No. 828, one of the rebuilt 2–4–0 double-framed engines of 1870, with a load of 170 tons, ran from Luton to Kentish Town, 28¾ miles, in 32 min., and attained a maximum speed of 81·8 m.p.h. down the 1 in 176 fall south of St. Albans. In the following year, 1900, No. 821 of the same class, ran the second portion of the Scotch express from Leicester to St. Pancras, 99 miles, in 110 min., with a load of no less than 210 tons. Truly the old veterans were distinguishing themselves, for good—nay excellent—as these engines had always been, they had never in the "eighties" given me such maximum speed records.

I have mentioned the above cases specially to draw attention to this point. Prior to 1890 the maximum speeds I had recorded were 76·6 m.p.h. behind a Great Northern 8 ft. single, and 76 m.p.h. with Midland 7 ft. coupled engine No. 1668. There was one exception, viz., the 81 m.p.h. record with the Great Western broad-gauge engine "Lightning" down the Wellington bank, but this took place at the bottom of a bank of 1 in 81, when the engine was "given her head" to see what she could do. I had several instances both on the Great Northern and Midland of 75 m.p.h., but even these were comparatively rare. The experiences of the late Mr. Rous-Marten, with whom I occasionally compared notes, were almost identical with mine, as regards the 75 and 76 m.p.h. highest speeds. With engines of the Midland No. 1562 class (the same as No. 1563 above) the maximum I recorded was 70·6 m.p.h. on the London road, and one instance with engine No. 1573 of 73½ m.p.h. descending the Settle bank on the Carlisle road, and as far as I can trace, the maximum of one of the old 800 class had been 72 m.p.h.

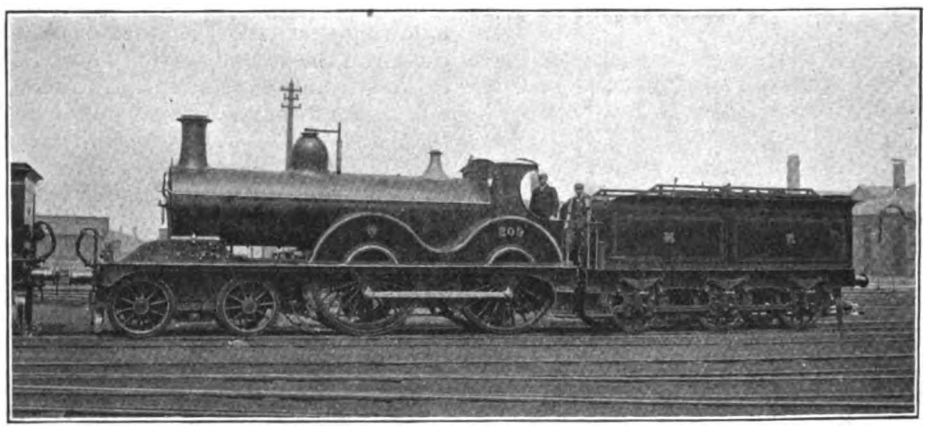
Why should the old engines now be

Digitized by Google

adding some 8 to 10 m.p.h. on to their previous best performances? As regards boiler power, pressure, cylinders, and wheel dimensions, they were unaltered. Moreover they were now running at these much increased speeds with considerably heavier trains than during the "eighties."

The same phenomena were noted by me on other railways. The London and North Western "Precedent" class engines were occasionally making speeds of 80 m.p.h.; during the "eighties" they rarely rose above 70 m.p.h. within my own and others' experiences. It is, however, right to add that in the case of these engines at the end of the century they had 150 lb. in place of the earlier 140 lb. pressure.

85 lb. rail. The 100 lb. rail would therefore deflect only about five sevenths the amount of the 85 lb. rail under the same load. The tensile strength of the tyres had increased from an average of 33–35 tons per sq. in. to 40–45 tons per sq. in., and in addition the rails themselves were of harder steel. It results therefore, that there would not only be much less bending of the rail, but that there would also be much less crushing or flattening of tyre and rail at the point of contact, and these two causes combined would reduce the resistance caused by rolling friction. This reduction of resistance seems to me to account for the increase of speed. It is only a theory,



4-4-0 ENGINE No. 209 (150 CLASS).

Built at Derby, 1897, for Manchester—Leicester—London traffic. Coupled wheels, 7 ft. diam. Cylinders, 19 in. by 26 in. Steam pressure, 160 lb. per sq. in.

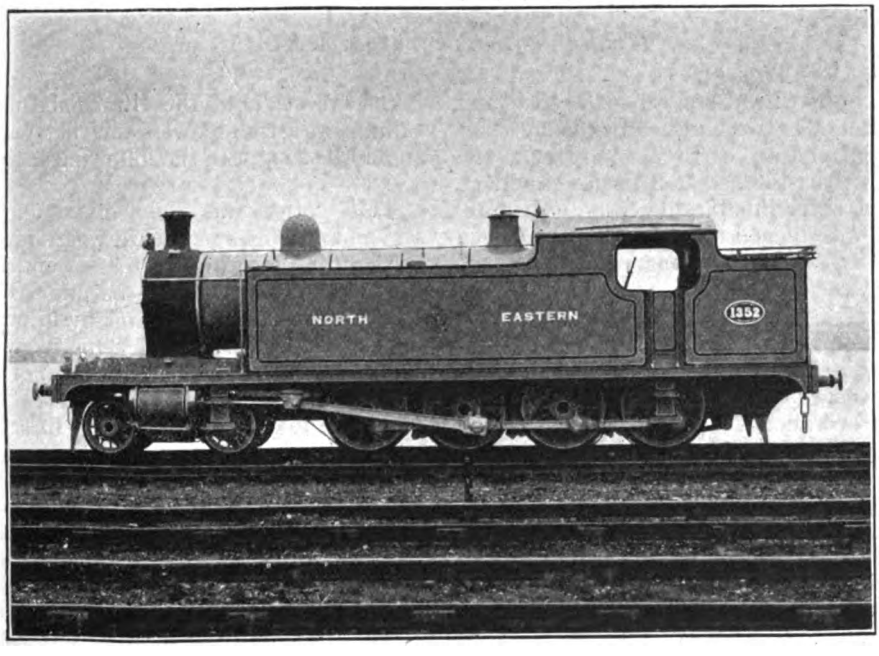
Having thought over the subject, I came to the conclusion that the cause of the increased speeds was due to the heavier and harder rails, and the harder tyres more recently in use. The rails of the early eighties on the Midland were 85 lb. to the yard, those of the later nineties were 100 lb. to the yard. A rough calculation of the moments of inertia of the sections of these rails gives the result that the moment of inertia of the 100 lb. rail is nearly 40 per cent. more than that of the

which I have not seen mentioned by others, but it seems at all events a rational one. The late Mr. Rous-Marten put down the steady increase of speed to the use of more powerful engines and higher steam pressures, and although this is undoubtedly true in very many instances, it does not account for the great increase of speed attained by the older engines, of which the dimensions and boiler pressures had not altered.

(*To be continued.*)

Digitized by Google

4-8-0 Three-Cylinder Tank Engine: North Eastern Railway.



THESE powerful engines, known as Class X, have three single-expansion cylinders, the middle one of which drives the leading coupled axle, whilst the outside cylinders drive the second pair of coupled wheels. This class has given very satisfactory results on the North Eastern Railway in hauling coal and goods trains, and tests recently carried out for the purpose of gauging its capabilities provided some notable and encouraging results.

One of the test trains was made up to represent 1,000 tons, comprising 10-ton and 20-ton coal wagons. It was run from Morpeth to Newcastle, and the engine proved able to deal with this load quite comfortably. Another test consisted of hauling a train weighing 1,200 tons, exclusive of engine, from Hull to Bridlington, and on this occasion one of the Class X engines reached a speed of 35 m.p.h. during a part of the trip. A third test showed that the engine could attain a speed of 15 m.p.h. on a grade of 1 in 92 between Bridlington and Filey, the load being 600 tons.

Principal particulars of the Class X tank engine are:—

Cylinders (3), diameter ..	18 in.
Piston stroke..	26 in.
Wheels, coupled	4 ft. 7¼ in.
Wheels, bogie	3 ft. 1¼ in.
Wheelbase, rigid	15 ft. 3 in.
Wheelbase, total	38 ft. 3 in.
Heating surface, tubes ..	1,169 sq. ft.
Heating surface, firebox ..	141 sq. ft.
Heating surface, total ..	1,310 sq. ft.
Grate area	23 sq. ft.

In working order the engine weighs 84 tons 13 cwt. Capacity of the tanks is 2,500 gall., and there is coal space for 4¼ tons. Adhesion weight is 66 tons 17 cwt.

Digitized by Google

The Barnstaple and Ilfracombe Railway. [No. II.]

By FRANK E. BOX.

(*Continued from page* 414, *vol. XLV.*)

The opposition of the Devon and Somerset, who were also introducing their own Bill, began early in January; the office of Parish Clerk at Bittadon, a village of some sixty inhabitants, was in dispute, and it was alleged that the plans had been deposited with the wrong person, but the point was unimportant, and the Bill went forward.

After a severe struggle the Devon and Somerset's Bill for their line from Taunton to Barnstaple passed, but the extension to Ilfracombe was thrown out in the House of Lords on March 15, a result which was received with much jubilation at Ilfracombe, the majority of the inhabitants remaining loyal to the local company. The Ilfracombe Railway Bill had against it three petitions, that of the landowners, that of the Devon and Somerset Railway, and that of the Ilfracombe Harbour Company, who were intimately connected with the Devon and Somerset party.

Although the latter railway did not put in an appearance to support their petition, the committee insisted on a clause being inserted binding the Ilfracombe Company to make overbridges and tunnels of sufficient width for a single line of mixed gauge, and, thus amended, the Bill passed the committee stage on June 6. Naturally this clause was not agreeable to the South Western Board, who at first declined to accept the amendment, but after the inhabitants of Ilfracombe had petitioned Parliament in vain that the Bill might pass without the clause, an arrangement was concluded whereby the Devon and Somerset were admitted to joint ownership, thereby taking the place of the private subscribers of the Ilfracombe company. An agreement was consequently scheduled to the Act providing that the Devon and Somerset should on or before October 10, 1864, declare their option to become joint owners with the South Western of the Ilfracombe undertaking, and that powers for that purpose should be sought in the following session of 1865.

This notice was duly given and the Devon and Somerset Board were urged by the South Western directors to anticipate the powers which would be granted, and to act with the latter company in providing the capital and commencing the works. In reply it was intimated that not only would they not do this, but also that steps would be taken to prevent the Ilfracombe company from proceeding with the works until the Devon and Somerset had been authorised to take their part in the work.

Early in November, 1864, the sudden death of Robert Wreford came as a great shock to his Ilfracombe friends; in the previous August he had been at Bude, where a preliminary meeting was held to consider a proposal of his for a railway to that town, and on his return to Exeter he made a further attempt to obtain redress of his Exmouth grievances; it is more than probable that the worry in connection with that business hastened his end.

In pleasing contrast to the proceedings that had embittered his life at Exmouth, it is gratifying to record that seven years after his death his exertions on behalf of the railway were not forgotten by the people of Ilfracombe, where his portrait formed a prominent feature of the procession which was part of the celebrations at the cutting of the first sod.

In the session of 1865 an Act ratifying the arrangement come to in the previous year was obtained, and Ilfracombe apparently was now in a happy position for, without subscribing anything, it would have a railway on the mixed gauge with direct communication with both the South Western and the Bristol and Exeter systems. The Act provided that the capital should be subscribed equally by the South Western and the Devon and

Digitized by Google

Somerset companies, and that the first call should be made within three months. This call was promptly paid by the former, but the Devon and Somerset delayed payment, and finally repudiated their liability.

Meanwhile, their engineers were engaged on the survey of an alternative line from near Bittadon, via the Oakridge and Score Valleys to the west end of Ilfracombe, from which it would appear that although unable to meet their obligations they possessed the means to apply to Parliament for another line to Ilfracombe. Notice was given at the end of 1865 of their intention to apply for release from their engagements whilst retaining power to work and use the line. Early in the next year, 1866, they were advised by counsel to come to terms with the South Western company, and a pledge was given that they would make a *bona fide* effort to meet their obligations, and their Bill was accordingly withdrawn.

The attitude of the South Western at this time is best indicated by the following quotation from a letter of Mr. Archibald Scott, the then traffic manager: "We are ready to begin and have paid up all our calls, and obtained judgment against the D. &. S. for the calls due by that company, and unless some satisfactory arrangement be made we shall enforce that judgment. We would prefer to go on pleasantly with them rather than be forced to coerce them, and I am in hopes that some settlement may now be come to enabling the Railway to be commenced in earnest." However, all attempts to induce the Devon and Somerset to provide their share of the capital failed, and although the litigation that ensued was likened to the case of Jarndyce *v.* Jarndyce, the end came at last. In the session of 1867 the Devon and Somerset applied to Parliament for release from their obligations in respect of the Ilfracombe railway on the ground of inability to construct their line from Taunton to Barnstaple, and of still greater inability to provide their share of money for the Ilfracombe line. Witnesses from Ilfracombe appeared against their Bill, but the recommendations of the Committee that it should pass, while the application by the South Western Company for an extension of time for the construction of the line should be refused, were acted upon; in the following session release was granted to the South Western Company by a formal Act for the Abandonment of the Railway. Thus the curtain was rung down upon the abortive attempts to bring the railway to Ilfracombe.

DEVON & SOMERSET

RAILWAY.

By Electric Telegraph.

"The Ilfracombe Portion of the North Devon and Somerset is THROWN OUT, so that the Ilfracombe Railway Bill is now UNOPPOSED."

J. TOGER, Printer, &c., 154, High Street, ILFRACOMBE.

A POSTER ISSUED IN ILFRACOMBE, 1863.

It should be mentioned, however, that the townsfolk had approached the Rev. Price in 1867, when it was certain that the scheme of 1864–5 was dead, proposing the formation of a private company as in 1863; but it was evident that nothing could be done without the assistance of one of the railways at Barnstaple, so the proposal was dropped. A curious rumour was also rife locally, a little later, that the London and North Western Railway contemplated a railway in North Devon. It probably

Digitized by Google

originated in the desire of that company to improve the steamboat service from Swansea.

Before proceeding with the happier narrative of the events which resulted in the construction of the Ilfracombe line, a word as to the position of the Devon and Somerset may not be out of place. Sanctioned in 1864, construction of the line from Norton Fitzwarren to Barnstaple made very dilatory progress, and it appeared doubtful if it would ever reach completion. It must be remembered that even Brunel was daunted by the difficulties of the country and dropped the original scheme of 1845 mainly on that account. The line was eventually opened to Barnstaple in November, 1873, and converted to the narrow gauge in May, 1881, but does not appear to have been particularly successful in its early operation.

Scarcely had the *coup de grace* been administered to the Acts of 1864–5, when hope was once more revived at Ilfracombe on the receipt of a letter from the South Western Company in October, 1868, suggesting that the "Regulation of Railways Act" of this year, by permitting the Board of Trade to approve the opening of "light" railways, paved the way for the construction of a railway of this character from Barnstaple to Ilfracombe. Negotiations were accordingly resumed, and in response to representations made by the promoters, Mr. Galbraith again surveyed the country and found that the Braunton line as originally selected by Mr. Errington in 1860 provided the only practicable route for a light railway. A suggestion that the Taw should be bridged at Fremington to avoid Sir W. Williams' property was untenable as it would have obstructed the navigation to Barnstaple.

It was found impossible to apply to Parliament in the session of 1869, but the railway was kept prominently before Ilfracombe throughout the year. At a public meeting held in February to consider the formation of a company, interest was aroused by the novel proposal of Messrs. Lucas and Wilkinson to tunnel the Taw Estuary from Fremington to Braunton, and thence to carry the line on the Fell system over the ridge, passing through West Down, Trimstone, and Twitchen to a terminus near the church, a total length of 9½ miles, at an estimated cost of £83,000. The Rev. Price thereupon announced that a scheme under South Western auspices would shortly be placed before the town, so a committee was appointed to consider all schemes that might be brought forward.

Towards the end of 1869 arrangements eminently satisfactory to the Corporation of Barnstaple were concluded by the promoters whereby the railway would cross the Taw immediately below the "long" bridge, and then pass along the quays, where several important improvements would be effected. Previous schemes had passed around the town on the east; the new proposals had the effect of securing the active support of the town in place of the apathy with which previous schemes had been regarded, and this change of feeling was reflected in the title, which, for the first time became the "Barnstaple and Ilfracombe Railway"

In November the necessary statutory notices were published and plans deposited, when it was found that Sir Wm. Williams had deposited a competing line advertised to run from Pudner's Meadow, Barnstaple, *via* Bittadon, to Jan's Well Close, by Sandy Lane at Ilfracombe; this line was, however, soon withdrawn in deference to the expressed opinion at Barnstaple and Ilfracombe.

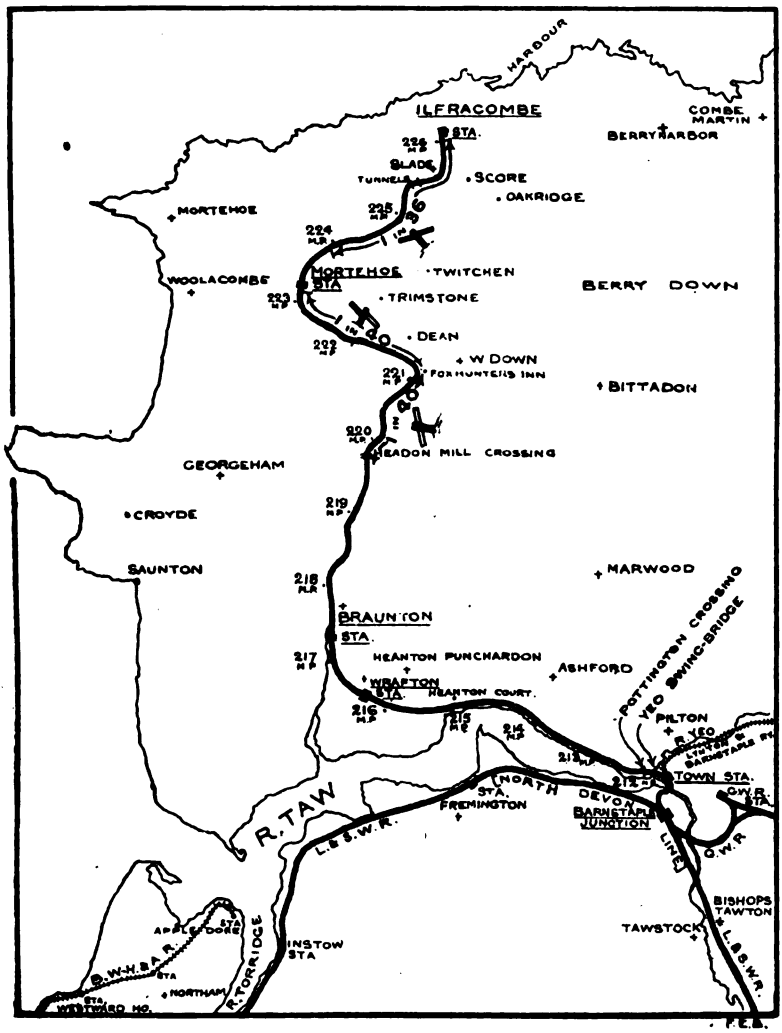
In the following year, 1870, the various legal, parliamentary, and financial obstacles were successfully surmounted, and the Barnstaple and Ilfracombe Railway Act, under which the line was this time to see completion, was duly placed on the Statute Book. The first reading of the Bill took place on February 10, the directors named being Thomas Pain, Philip Stoneham, Thomas Fry, William Ridd Gould, Benjamin Price, and Joseph Hamilton Beattie, of whom the Rev. B. Price alone remained of the original 1864 directors. The capital was stated to be £105,000 in £10 shares, with borrowing powers of £35,000, and the line was to be constructed on the light principle, the weight on any one axle being limited to eight tons.

The Bill went before Committee on March 15, 16, and 17, the only serious opposition coming from Sir Wm. Williams. The principal witnesses in support were drawn from the influential inhabitants of

Digitized by Google

Barnstaple, Braunton, and Ilfracombe, and also included the Earl of Portsmouth and Sir Stafford Northcote. Among the technical witnesses were Mr. Archibald Scott, the traffic manager, Mr. W. G. Beattie, the assistant mechanical engineer, and Mr. W. R. Galbraith, the engineer, all of the London and South Western Railway, and also Mr. J. E. McConnell, formerly locomotive superintendent of the Southern Division of the London and North Western Railway.

Mr. Beattie produced drawings of the locomotives with which it was proposed to work the line. These showed a six-coupled outside-cylinder engine of which the leading dimensions were: cylinders, 16 in. by 20 in.; wheels, 4 ft. 6 in.; heating surface, 1,000 sq. ft.; and weight under 24 tons. It would be capable of hauling 700 tons on the level and 100 tons up the 1 in 37 gradient which it was proposed to adopt. The engines actually constructed by Beyer, Peacock & Co. for the line closely followed these dimensions, but had inside cylinders.



MAP SHOWING ILFRACOMBE BRANCH, LONDON & SOUTH WESTERN RAILWAY.

Mr. McConnell, whose early experience on the working of the Lickey Incline made his evidence particularly valuable, confirmed Mr. Beattie's statements as to

Digitized by Google

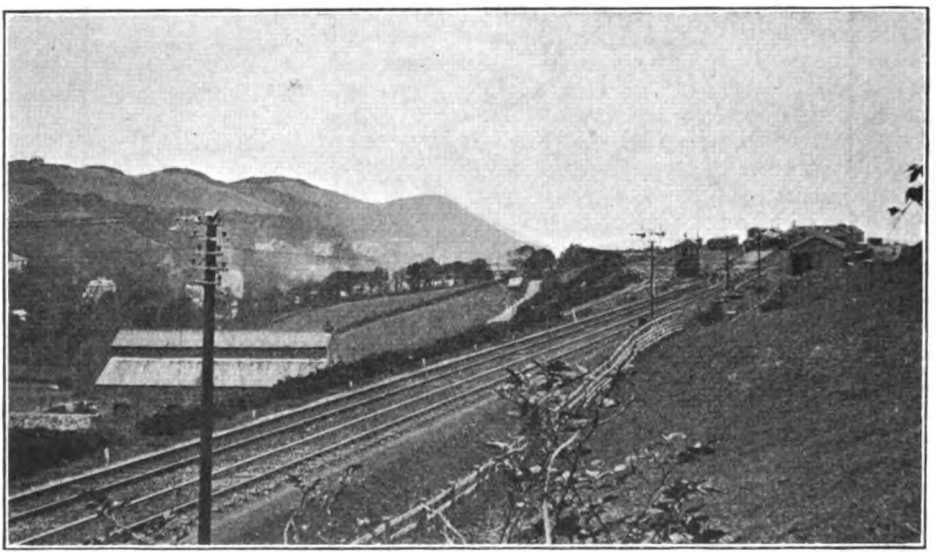
the suitability of the locomotives to work the severe gradients of the Ilfracombe line.

Mr. Galbraith explained the difficulty of obtaining an easy approach to Ilfracombe, and traced the routes of the earlier proposals, pointing out their several disadvantages. He was closely examined as to the engineering works of the proposed line and the relative cost as compared with those of previous schemes, and explained that the reverse curves of 7¼ and 7½ chains radius, which were objected to, were located between the two stations at Barnstaple, where the speed would be very low, the distance being only about half a mile; on the remainder of the line there would be nothing worse than 14 chains. He proposed to use 50-lb. rails, the South Western at that period using 75-lb. rails on their main lines.

On the conclusion of Mr. Galbraith's evidence it was announced that Sir Wm. Williams had met the promotors in a very liberal spirit, when all further opposition was withdrawn; and the Bill passed the Committee stage; only a few days later Sir William died.

The effect of the success of the Bill on Ilfracombe was described as magical. Flags and banners were hung out, and a procession headed by a band paraded the town; two days later the omnibus bringing the returning witnesses was met by the crowd, who insisted on removing the horses and drawing the vehicle through the town, and demanded speeches, which were delivered from its top by the principal witnesses.

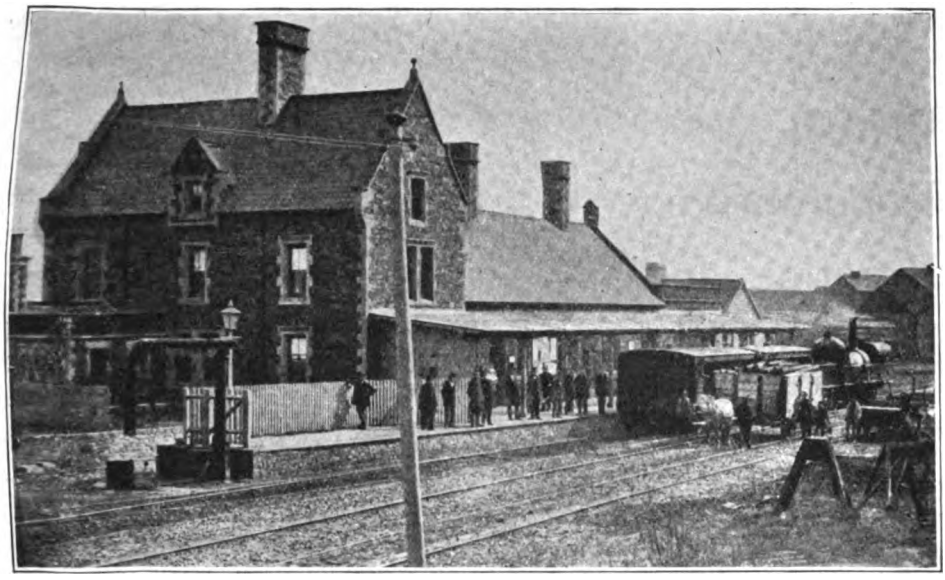
The Bill passed unopposed through the Lords, and received the Royal Assent on July 4, when steps were taken to acquire the land and raise the capital; Mr. James Taylor, who had recently completed the Torrington extension, secured the contract for the construction for £90,000.



Photo] GENERAL VIEW OF ILFRACOMBE TERMINUS. [*F. E. Box.*

It was not until September 27, 1871, that the first practical step towards the construction was taken, when the ceremony of "cutting the first sod" was performed at Ilfracombe by Mr. Thomas Pain, the chairman. Weather conditions at the outset bade fair to rival those which inauspiciously graced the historic occasion at Gillingham, when the Salisbury and Yeovil Railway was inaugurated. The inevitable procession was formed outside the Ilfracombe Hotel, and proceeded in the rain to the field where the station now overlooks the town. Prominent among the bands and banners were the clergy, the directors of the line, officials of

Digitized by Google



By Courtesy.] **BARNSTAPLE STATION IN 1853.** [*W. Tolley.*

the South Western, the contractor and engineer, and also the portrait of Robert Wreford.

On arrival at the grand stand the "sun shed a few transient beams," a blessing was pronounced by the Vicar, and Mr. Pain then "commenced to handle the spade with workmanlike energy. Having displaced several spadefuls of Mother Earth he filled his barrow and wheeled it to the end of the planks and there tipped it." Several ladies then tried their hands with the spade and barrow, which were described as being "of Spanish mahogany, with a cutting edge and tyres of bright metal." At Braunton the similar ceremony was performed by Mr. George Hartnoll.

Mainly owing to scarcity of labour the time allowed for the completion of the works, which expired in April, 1873, was exceeded, and it was not until the summer of the following year that the line was completed.

(*To be continued.*)

Digitized by Google

British Locomotive Practice and Performance.

By CECIL J ALLEN.

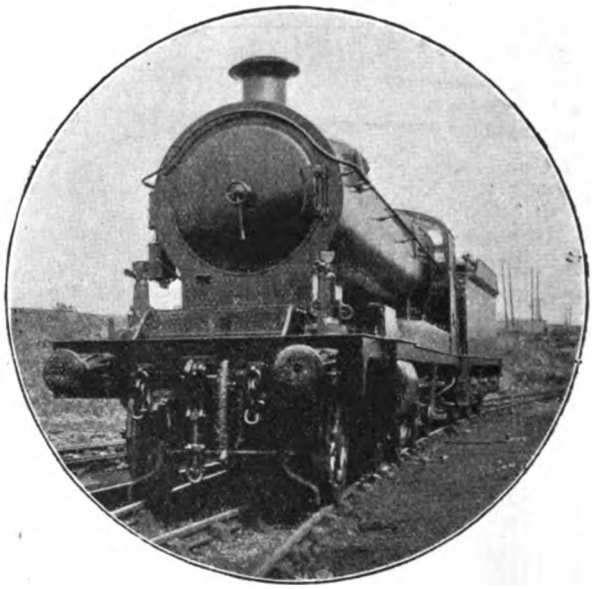


Photo.] [*F. H. Stingemore.*

GREAT WESTERN RAILWAY.

Robinson type 2-8-0 engine, No. 3006. Photograph shows jacks and Westinghouse brake still fitted.

NINETEEN hundred and nineteen has been a year of perspiration rather than inspiration in locomotive building. The vital necessity of turning out engines in large numbers in order to cope at the earliest possible time with war arrears of construction has compelled in most cases the use of existing drawings, templates and patterns, with the result that very few new designs have seen the light during the past twelve months. But indications at the present time point to further activity in design in a good many directions, which should bear fruit in the opening year of the decade on which we have just entered, and make it one of distinct interest.

The most noteworthy locomotive event of 1919, in my opinion, has been the equipment by Mr. J. G. Robinson of one of the 2–8–0 Great Central engines of his earlier series—No. 353—with apparatus for burning pulverised fuel. In view of the increasing price and decreasing quality of much of the coal now available, any means of utilising second-rate fuel, which in an ordinary locomotive firebox would prove practically unworkable by reason of its clinker-forming tendencies and excessive residue of ash, is of prime economic importance. Stationary water-tube boilers and industrial furnaces have in many cases been so fired for some time past, but the problem of adapting the locomotive boiler, with its much heavier draught, is by no means so simple. Experiments have been conducted in the United States and elsewhere with pulverised coal as a fuel for locomotives, but Mr. Robinson's successful apparatus is the first of its kind in this country. It is interesting, also, to note that he is similarly equipping one of the large-boilered 2–8–0's of the "412" series, which is for this purpose to be supplied with a large bogie tender of special design, having a capacity for 7 tons of fuel and 4,000 gallons of water.

Any form of slack or coarse coal dust is suitable for consumption—it is even undesirable to use a high-grade round coal for the purpose, owing to the extra labour required in crushing—and as a preliminary this has to be thoroughly dried, then passed through a special grinding mill, and there reduced to an exceedingly fine powder before being

Digitized by Google

placed in the tender. The mill mechanically passes this coal "flour" into an overhead storage bin, from which it is delivered by a vertical feed pipe into a watertight receptacle in the tender. At the bottom of the coal "tank" are two large horizontal screws, or conveyors, worked by a small steam engine, and these carry the fuel into two mixing chambers, where it meets a blast of air produced by a steam-driven rotary fan. The gear for all these operations is arranged in the tender. By the air-blast the pulverised fuel is carried forward through two flexible feed-pipes into a second pair of mixing chambers or tubes on the engine itself, where the tender air-blast is reinforced by a second supply of air, controlled by dampers. From the mixing tubes the fuel passes finally into the firebox, or combustion chamber, of which an essential feature is a lining of firebrick in addition to usual brick arch. Orifices are arranged in this lining through which a third supply of air may be drawn for combustion purposes under the suction influence, *via* the tubes, of the steam blast in the smokebox. The rate of supply of fuel to the firebox is controlled by varying the speed of the conveyor screws in the tender, or it may, of course, be stopped altogether. For raising steam initially in the boiler, it is necessary to supply steam from an outside source to the conveyor and blast engines (on the tender), and to the blower in the smokebox, until sufficient steam has been generated in the locomotive boiler itself.

As a set-off to this special equipment required on the engine and at the locomotive shed in connection with the use of pulverised fuel, there are numerous compensating advantages. Owing to the exceedingly fine sub-division of the fuel, the surfaces exposed to the air in the firebox are vastly increased, relatively to the quantity used, and complete combustion is thereby practically instantaneous. Consequently the proportion of unconsumed gas or coal dust passing into the tubes is almost nil, while as a natural corollary there can be no sparks, and the production of smoke is infinitesimal, as also that of ash or clinker. A further result is that the time occupied in raising steam in the first instance is much reduced. In addition, elimination of all the physical labour attached to firing renders unnecessary any limit on this ground to the sustained power of a large modern locomotive. And even if the economic value of these advantages did not fully balance the cost of constructing and maintaining the equipment described, there is always the substantial economy entailed in the use of what is virtually a waste product

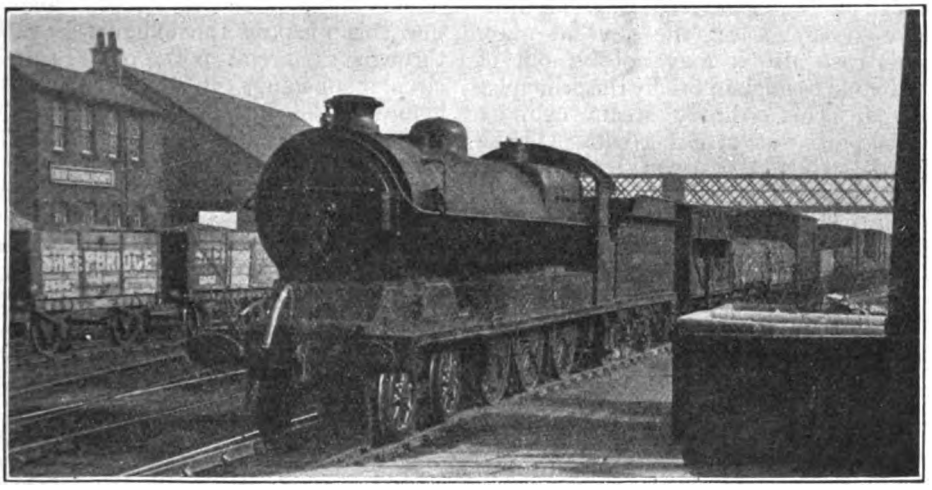


Photo.] GREAT CENTRAL RAILWAY. [*T. W. Idle.*

Fast goods train passing Guide Bridge. Mixed traffic engine, No. 439, "Sutton Nelthorpe."

Digitized by Google

at the colliery, rather than high-class coal. I have described the principle thus at length, as it seems to me to be one of considerable importance at the present juncture, and one that we are likely to see considerably extended in its operation in the near future. Mr. Robinson, whose originality in design seems rather to increase than to diminish with the passage of years, is to be congratulated in that he is the first British locomotive engineer to turn his attention in so practical a way to the use of pulverised fuel on locomotives.

Another interesting engine of the year 1919 has been the 3-cylinder "Uniflow" 4-4-2—No. 2212—of the North-Eastern Railway, designed by Sir Vincent Raven, also one of the most fertile of our locomotive designers at the present day. In this case also it may not be out of place for me to explain briefly the principles involved. The ordinary steam cylinder has two ports, one at either end. On the forward stroke the live steam enters through the front port and expels the piston; on the return stroke the piston, forced backwards by live steam entering the rear port, pushes the expanded steam from the forward stroke back through the same port by which it entered the cylinder, the main function of the slide-valve or piston-valve being to open communication alternately between the steam and exhaust pipes and the ports for this purpose. Now the passage of the exhaust steam out of the cylinder and through the port, at a much reduced temperature as a result of its expansion, has the effect of cooling all the adjacent metal, which in its turn cools the live steam as it enters the cylinder on the next return stroke. That is to say, a constant "exchange" of heat is going on between the live steam and the exhaust steam, with a proportionate loss in the thermal efficiency of the engine. The main object of the "Uniflow" system is to reduce these heat losses to a minimum. For this purpose the exhaust is carried through a special port, or a series of circular openings, in the centre of the cylinder, the end ports being employed as usual to admit live steam. This arrangement obviously necessitates the use of a cylinder practically double the length of the ordinary cylinder, and of a piston of sufficient length exactly to fill in the space between the exhaust port and one or other of the steam ports.

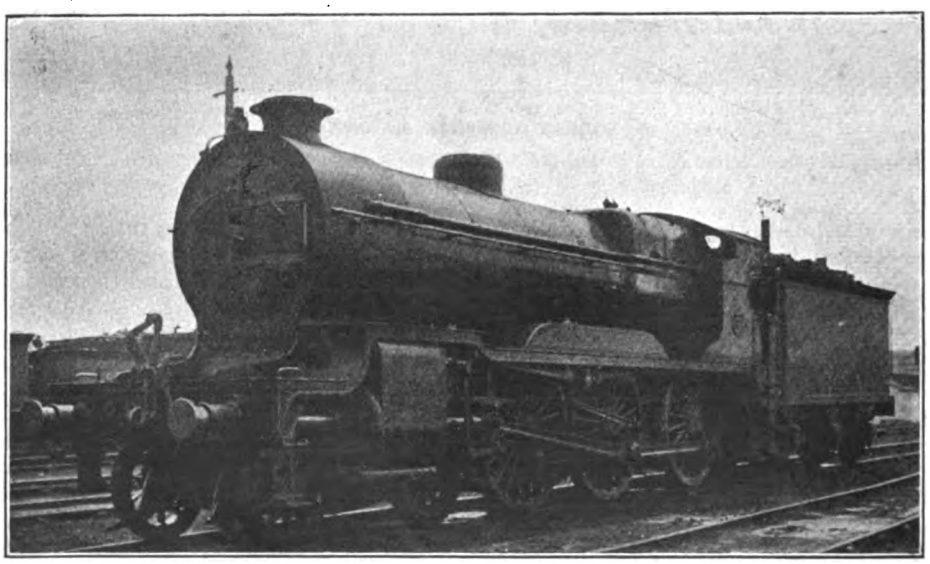


Photo.] CALEDONIAN RAILWAY. [*W. H. Whitworth.*

Mixed traffic 4-6-0 superheater locomotive, No. 938. Built originally for the Highland Railway but taken over by the Caledonian Railway.

Digitized by Google

Photo.] **CALEDONIAN RAILWAY.** [*Ian Dundas Orr.*

Oban–Glasgow train approaching Plean. 4-4-0 engine, No. 773.

Exhaust takes place immediately the piston uncovers the exhaust port at the end of the stroke, its sudden, rather than sustained, character, causing the locomotive to be instantly recognisable when in motion by the explosive character of its puffing. This uncovering of the exhaust port at 90 per cent of the forward stroke obviously means that it is again closed completely at 10 per cent of the return stroke, while a small proportion of the exhaust is still remaining in that end of the cylinder. In order to allow of this escaping, openings are arranged in the piston-valves, whereby this exhaust steam can rejoin its main body. As the driver notches up his reversing lever, these openings are reduced, until, when the running position for high speeds is reached, they disappear altogether, and the exhaust is then carried away entirely through the central port. This latter has a larger clearance volume than the port of an ordinary cylinder, and by the piston-valve arrangements just described the compression in the cylinder—one of the principal difficulties in connection with a "Uni-flow" system—is varied in such a way as to approximate fairly closely to its correct theoretical degree. But No. 2212 is thus not an absolutely true "Uniflow" locomotive, as there is a small flow of exhaust steam through the admission ports, and the piston-valves, instead of controlling the admission only, act in a minor degree as auxiliaries to the exhaust port proper. In this way Sir Vincent Raven has found it possible to employ piston-valves of the ordinary pattern, instead of the complicated double-beat drop valves which have always appeared an indispensable adjunct of the German Stumpf system. For all that, however, exchange of heat between the used and unused steam is reduced to minute proportions, with the result that condensation of the steam on entering the cylinder (or abstraction of its heat in the case of superheated steam) is practically done away with.

Up to the present I cannot confess to having enjoyed any particularly notable runs behind the new engine, but it is quite possible that adjustments in the design will enable No. 2212 to justify itself in every way on the hardest duties. On the 9.38 p.m. express from York to Newcastle (5.30 p.m. *ex*-King's Cross), with a somewhat staggering load of 76 axles, weighing 512 tons empty, and not less than 560 tons full, it took us 12 min. 25 sec. to get through Beningbrough, 5·5 miles; 20½ min. to Alne, 11·2 miles; 35 min. 35 sec. to Thirsk, 22·2 miles; and 47 min. 5 sec. to stopping at Northallerton, 30 miles. Over this practically level track we could not manage any higher speed than 47½ m.p.h., at

Digitized by Google

Thirsk. The second stage of 14·1 miles from Northallerton to Darlington consumed 24 min., Eryholme, 8·9 miles, being passed in 16 min. 10 sec. from the fresh start. In this way No. 2212 lost a total of no less than 21 min. on schedule time, which, even allowing for the fact of the then existing schedule being impossibly tight, was an unsatisfactory performance. By way of comparison, the capably-driven No. 2172, of the ordinary 3-cylinder 4-4-2 Class "Z" series, put up a very fine performance on the same train with a but little lighter 73-axle train weighing 540 tons in all. We were through Beningbrough in 10 min. 10 sec.; Alne in 16 min. 20 sec., at 61 m.p.h.; Pilmoor, 16·1 miles, in 21 min. 20 sec., at 58½ m.p.h., and Sessay, 18 miles, in 23 min. 20 sec., also at the last-mentioned speed. Before Thirsk we had again reached 61 m.p.h., but were unfortunately compelled there to make a special stop, the start-to-stop time from York being 28¼ min. Re-starting, we ran the 7·8 miles to Northallerton in 12 min. 35 sec.; unchecked we should have completed this 30 miles in rather under 36 min., or at least 11 min. less than No. 2212's time. From Northallerton we did magnificently, passing Danby Wiske, 3·7 miles, in 7 min., at 54 m.p.h.; Eryholme, 8·9 miles, in 12¾ min., at the same speed (after 4 miles up at 1 in 696); and then, attaining 64½ m.p.h. past Croft Spa, we reached Darlington in 18 min. 50 sec. —only 50 sec. over schedule, and nearly 5¼ min. under the time made by No. 2212. But, as regards the latter engine, second acquaintance may prove more favourable.

The third undoubted novelty is Mr. G. J. Churchward's "mixed traffic" 2-8-0 for the Great Western Railway—No. 4700. Eight-coupled engines—and even ten-coupled—have frequently been used abroad and in America and the Colonies for passenger purposes, where the gradients are sufficiently severe to warrant it, but, beyond the 0-8-2 tanks of the Great Northern Railway (some of which, by the way, have recently returned to the London district, presumably in virtue of a shortage in the usual London suburban 0-6-2 and 4-4-2 types), and occasional use of the Great Central tender 2-8-0's on local passenger trains in the Manchester district, this is, so far as I know, the first eight-coupled in Great Britain designed expressly to take a share in passenger traffic. With the standard large Belpaire boiler pressed to 225 lb., 19 in. by 30 in. cylinders, and 5 ft. 8 in. driving wheels, the new engine, judging by the details of a run supplied by a correspondent, appears to have quite a surprising turn of speed. The journey in question was made on the 7.13 p.m. express from Swindon to London, a heavy train combining portions from both South Wales and the West of England and made up on this occasion to fourteen bogie vehicles, of which, unfortunately, the writer does not specify the type or weight; his timings are like-

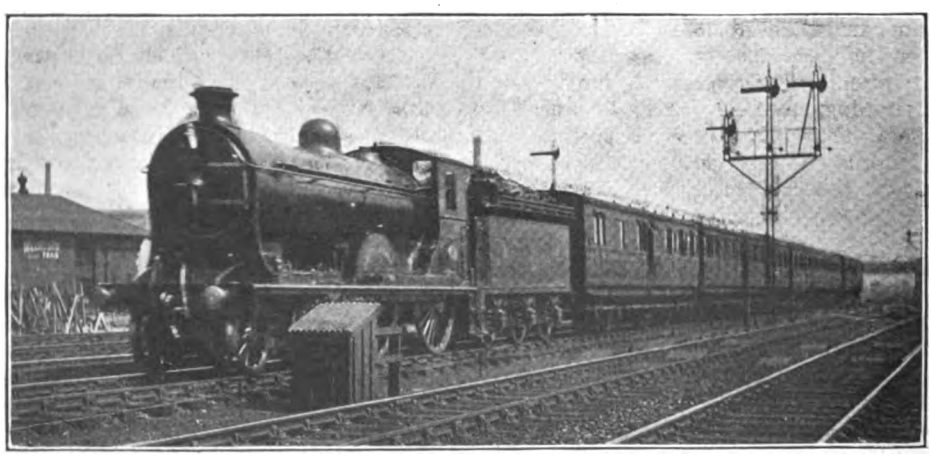


Photo.] NORTH BRITISH RAILWAY. [*Chas. S. Lake.*

Stopping train from Edinburgh drawn by 4-4-0 superheater engine of the "Scott" class.

Digitized by Google

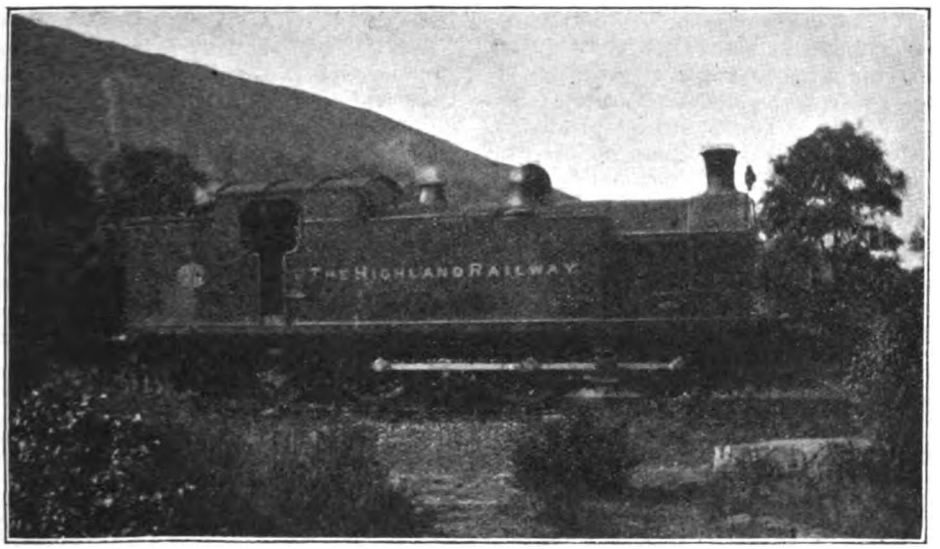


Photo.] HIGHLAND RAILWAY. [*D. Millar Craig.*

0-6-4 tank engine, No. 68 (employed for banking purposes between Blair Atholl and Kingussie.)

wise very approximate, and his distances far from correct. After a bad check at Highworth Junction, No. 4700 passed Uffington, 10·8 miles, in 15 min., but was pulled up by adverse signals at Wantage Road, 16·9 miles, 22 min. after leaving Swindon. Restarting, the driver achieved some smart travelling, passing Didcot, 7·3 miles, in 9 min; Cholsey, 11·9 miles, in 13½ min.; and Pangbourne, 18·9 miles, in 20 min.; with a top speed of 66 m.p.h. over Goring troughs. So Reading, 24·4 miles from Wantage Road, was reached in 26 min., start to stop. From there Twyford, 5 miles, was passed in 7 min.; Maidenhead, 11·8 miles, in 14 min.; Slough, 17·5 miles, in 20 min.; Southall, 26·9 miles, in 29 min.; and Ealing, 30·3 miles, was reached in 34 min. Such free running of an eight-coupled engine at comparatively high speeds is noteworthy.

There are only three further new types that can be credited to 1919. Mr. Robinson's large-boilered mixed traffic 4–6–0 engine, No. 416, for the Great Central Railway, comes first in point of date, and then Mr. C. Cumming's new 4–6–0 "Clan" class—an enlarged edition of his 4–6–0 goods engines of last year—for the Highland Railway. Mr. Cumming appears to have an exceptional eye for the graceful in locomotive "lines," and certainly these engines, as also his two 4–4–0's, *Snaigow* and *Durn*, would be hard to beat in the matter of appearance. Lastly, we have Sir Vincent Raven's new three-cylinder North Eastern 0–8–0, No. 901, Class T 3, incorporating the method of propulsion which seems likely to become standard in all new Darlington constructions. The higher pitch of the boiler, as compared with class T 2, greatly improves the look of the engine, as it does away with the woefully misshapen appearance of its predecessors, with their tall chimneys and apologies for domes. It seems a little surprising that the 2–8–0 wheel arrangement has not been adopted in the new engines, in view of the increased weight at the leading end. In addition to the foregoing, Mr. R. E. L. Maunsell's rebuilding of South Eastern & Chatham 4–4–0 No. 179 with superheating equipment has given that engine a new aspect and character similar to his very original 2–6–4 and 2–6–0 models, Nos. 790 and 810. On the London, Brighton & South Coast Railway Mr. L. B. Billinton has just superheated the first of the B4 class

Digitized by Google

4-4-0 engines—No. 46, *Prince of Wales*—with successful results, the ordinary slide-valves being retained. Mr. W. P. Reid also is making a commencement in this way with several of the earlier 4-4-0 types on the North British Railway. Elsewhere the superheating of existing types of engines goes on apace on the bulk of British main lines, especially of 4-4-0 passenger engines.

As regards general building from existing designs, the North Eastern Railway has recently completed the series of T2 class engines—superheater 0-8-0 mineral—running from 2213 to 2252, 40 in all, and the first of the 50 similar engines to be built by Messrs. Armstrong, Whitworth & Co. at Elswick Works, No. 2253, has just been delivered, and has been made the subject of many approbatory notices in the Press. One of the principal features emphasised is the exceptional comfort of the cab, but this is only of the standard North Eastern type. Though undoubtedly good in respect of general roominess and shelter, it falls considerably short of the modern Great Eastern cab—that of the Great Eastern 4-6-0 express engines is, indeed, in my opinion, unexcelled in this country. Another point made by the newspapers was the determination of the Elswick people to make their locomotive building plant the "largest in the world." If so be that they ever hear of such a firm as Baldwin's, in the United States, they will find that the fulfilment of this laudable ambition would at least involve the removal of the River Tyne, in order to afford the necessary space!

The Great Eastern Railway, having turned out five more superheated 0-6-0's of the T77, or 1140, class, is now building five more of the same type, and in addition, a further five with 1500 class boilers. A series of 20 4-6-0 superheater engines is also under construction by Messrs. Beardmore—the first locomotives built by outside builders for the Great Eastern Railway since 1874.

On the London & North Western Railway all energies are being concentrated on the construction of 60 new 4-6-0 superheater engines of the "Prince of Wales" class—a handy engine for all-round work, with a good record in the matter of moderate coal consumption. The Great Western Railway has been building 2-8-0's (2866-2875) and 2-6-0's of the standard type. The Great Northern Railway has built some further superheater 0-6-0's, and has also taken delivery of the 20 2-6-0's (1660-1679) and 15 2-8-0's

Photo.] **LONDON & NORTH WESTERN RAILWAY.** [*F. H. Stingemore.*

Down Manchester express passing Watford. 4-4-0 superheater No. 789, *Windermere* ("George the Fifth" class).

Digitized by Google

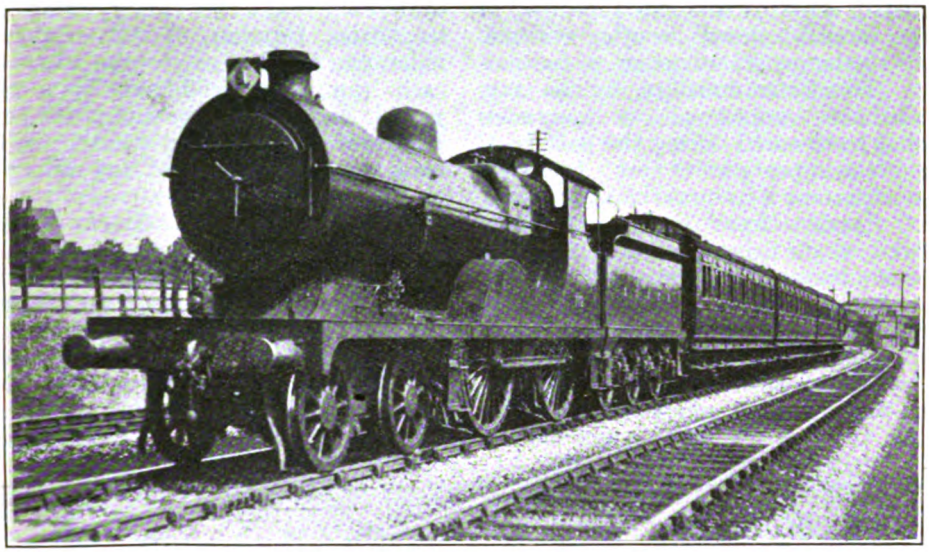


Photo.] **SOUTH EASTERN & CHATHAM RAILWAY.** [*W. H. C. Kelland.*

Up express passing Grove Park. 4-4-0 superheater engine, No. 772.

(462–476) from the North British Locomotive Company. On the Great Central new large-boilered 2–8–0's have been the principal addition to the locomotive stock; on the Lancashire & Yorkshire large 0–8–0's, with Horwich superheater, and non-superheated 0–6–0's; on the Midland and North British railways superheated 0–6–0's, with a further series of 6 ft. 7 in. superheated 4–4–0's in the latter case also; while on the London, Brighton & South Coast Railway new "Moguls" and 4–6–4 express tank engines are building, and, so it is reported, 2–6–2 tanks are contemplated. An interesting announcement also is the intention of the Furness Railway to build tank engines of the 4–6–4 type, 33 per cent. more powerful than any engine at present existing on that line, with 5 ft. 8 in. driving wheels, 19½ in. by 26 in. cylinders, a 5 ft. diameter boiler giving 2,000 sq. ft. heating surface and 26 sq. ft. grate area, and a working pressure of 170 lb. per sq. in. Reconstruction of the long viaducts on this system, now complete, permits of axle loads up to 18¼ tons, and has made possible the use of engines of these dimensions, which are expected to weigh 98 tons in working order. *Apropos* of tank engines, Mr. Gresley, of the Great Northern Railway, has recently been conducting exhaustive experiments between No. 1646, a large-boilered "Mogul," and the superheated 0-6-2 tank No. 1598, in the London suburban district. It is understood that this is preliminary to the design of a new 2-6-2 or 2-6-4 tank locomotive for suburban use. From intimate and painful acquaintance with the tortoise-like rate of progression current on the High Barnet branch, I wish Mr. Gresley all success, and shall welcome the newcomer with open arms when it materialises.

One of the most interesting events of 1918, and an early, if perhaps unintentional, step towards British locomotive standardisation, has been the taking over by various companies of the large number of 2–8–0 engines, either built or still in course of construction at the time of the Armistice, and said to total 235, to Mr. J. G. Robinson's Great Central designs. The London & North Western acquisitions will ultimately total no less than 70, and in this connection the interesting speculation has occurred to me as to how the London & North Western practice of driving from the left-hand side of the engine is observed in these engines, which, according to standard Great Central practice, would be driven from the right-hand side. A large number has also been purchased by the Great Western Railway, and the

Digitized by Google

engines in question are also appearing in smaller numbers on various other systems, owing to the general shortage of locomotives. This latter difficulty, by the way, has led to various curious spectacles which I have noted during the past year, such as the appearance of two "Jumbos" on so important a train as the 1 p.m. West Coast Express from Euston, or of a Midland single-driver on the principal afternoon Manchester express from Leicester to London. I was a passenger on the latter train, which was made up to eight bogie vehicles, including restaurant cars, but as this was before the recent accelerations, to my lasting annoyance I did not trouble to time the run, having had no idea as to the engine which had taken us over at Leicester, until I alighted at St. Pancras.

Finally there is the momentous announcement that the directors of the North Eastern Railway have decided to electrify the main line between York and Newcastle, in addition to the loop route from Northallerton to Ferryhill *via* Stockton, and that all trains over these sections, passenger and goods alike, are to be hauled by independent electric engines. Out of curiosity as to the maximum speeds attainable by existing electric services, I took the trouble recently to time a couple of runs between Southport and Liverpool, Lancashire and Yorkshire Railway; in both cases 3-coach "sets" were employed, the trains being non-stop from Birkdale. To Ainsdale, 2·5 miles, the times were 3¾ min. exactly on each run; to Freshfield, 5·2 miles, 7 min. and 6 min. 55 sec.; to Altcar, 7·8 miles, 9 min. 50 and 40 sec.; to Hall Road, 10·1 miles, 12½ and 12¼ min.; and to Seaforth, 13·1 miles, 16 and 15¾ min. exactly. Severe p.w.r. checks followed at Marsh Lane and Bank Hall, making the times to Sandhills, 15·8 miles, 20 min. 20 sec. and 19 min. 55 sec.; to Liverpool, 17·3 miles, the total times were 22½ min. on the second run, without further checks, and 23 min. 35 sec. on the first, with a signal check beyond Sandhills. The loss by checks was, of course, quite small in each case, owing to the rapid subsequent acceleration, but I should estimate the net times at 22 and 21½ min. respectively, against a 24-min. schedule. As regards speeds, we had attained 49 and 51 m.p.h. at Ainsdale, and 53 and 53½ at Freshfield, subsequently increased to the maximum in each case of 54 and 57 m.p.h. at Altcar; minima of 50 and 50½ m.p.h. beyond Blundellsands were succeeded by maxima of 54 m.p.h. on both runs at Seaforth. Average speeds over the 7·8 miles from Freshfield to Seaforth were thus 52·0 and 52·7 m.p.h. —a sustained record over a level track which could probably not be excelled by any other British electrified service, with the possible exception of the London

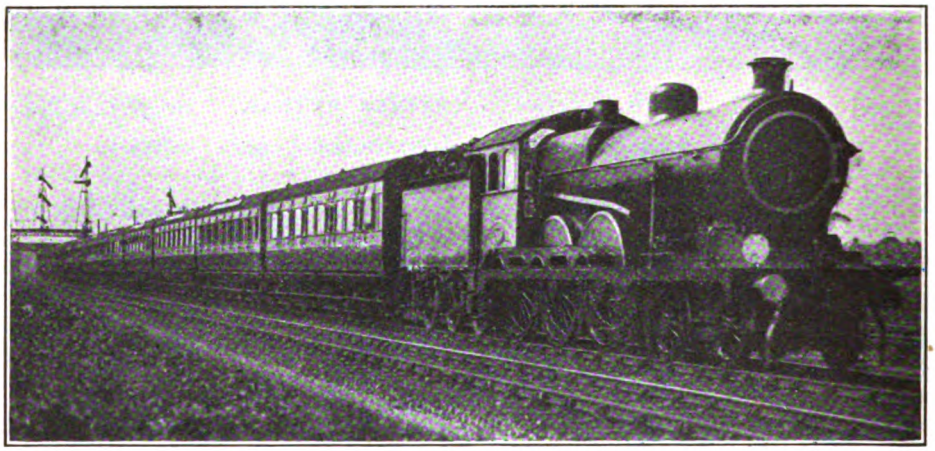


Photo.] **GREAT EASTERN RAILWAY.** [*J. Macartney Robbins.*

Cromer Restaurant Car express passing Chadwell Heath. **4-6-0 superheater locomotive (1500 class).**

Digitized by Google

and South Western. It will be interesting to observe the future times made by electrically-hauled East Coast expresses between York and Newcastle.

As extensive consideration has already been given to the time-table changes of 1919 in the articles of the past year, there is no need to refer to them further except by way of brief comment on those which have just come into force at the time of writing. The Great Northern Railway had a splendid programme of acceleration for December 1, the London-Leeds service deriving the principal benefit. Thirteen minutes bettering of the 7.30 a.m. *ex*-King's Cross has reduced its overall time to 4 hr. 10 min., the 91 min. schedule to Peterborough, 39 min. thence to Grantham, and 38 min. thence to Retford, being all noteworthy times, especially the first and third, which involve average speeds of 50·4 and 52·3 m.p h respectively. A useful (and, indeed, long-needed) connection is run off this train from Doncaster to York. The 10.10 a.m. down is unaltered, but the 1.30 p.m. is quickened by 22 min., 7 min. being cut from the London-Peterborough time (now 96 min.) and 5 min. from the subsequent stage to Doncaster (now 99 min.), while the Doncaster-Wakefield (Kirkgate) length is reduced by 7 min. (to 26 min.). No alteration is made to the 4.0 p.m. down, other than the addition of a compartment tea-car, but the 5.40 p.m., like the 1.30 p.m., reaches Leeds in 4 hr. 20 min., running to Peterborough in 94 min., thence to Grantham in the smart time of 38 min., and from Grantham to Doncaster in 61 min.—respective gains of 7, 6 and 4 min. Of the up trains the 7.50 a.m. *ex*-Leeds is altered to conform in working to the 7.30 a.m. *ex*-King's Cross, by completing the journey in 4 hr. 10 min., the final run up from Peterborough being made in 91 min. There is no modification of the 9.35 a.m. or 3.30 p.m. up, which were already 4 hr. 20 min. trains, but the 5.30 p.m. *ex*-Leeds is accelerated to the same figure, *i.e.*, by 20 min. on its previous times. The semi-fast 11.15 a.m. from Leeds to London has also been drastically accelerated, by 37 min., and has now a very tight timing, as witness 33 min. from Grantham to Peterborough (= 52·9 m.p.h.), 22 min. thence to Huntingdon, and 24 min. from St. Neot's to Hitchin, 19·8 miles almost entirely uphill.

Photo.] GREAT NORTHERN RAILWAY. [*G. F. Dearden.*

Up Leeds and Bradford express passing Potter's Bar. Superheated 4-4-2 locomotive, No. 257 (small-boilered type).

Principal changes in the East Coast services, in which the North Eastern Company is also concerned, relate to the popular 5.30 p.m. express from King's Cross to Newcastle, and the return train at 7.50 a.m. Startling to relate, neither of these trains is now scheduled to call at York. The down express, accelerated by 9 min. to Grantham (134 min. = 51·1

Digitized by Google

m.p.h.), runs from there to Clifton Junction, at the north end of York station, (where engines are changed), in 99 min., and thence to Darlington, about 43¾ miles, in 51 min. Arrival here is 17 min. earlier than previously, but at Newcastle only 13 min. earlier—at 11.12 instead of 11.25 p.m. —the times over the difficult section north of Darlington being eased to secure better punctuality. This involves the running of a special relieving express from London to York and another from York to Newcastle. The former service is obtained by the reinstatement of the 6.5 p.m. dining car express from King's Cross to Hull (to Grantham in 127 min. and thence to Doncaster in 60 min. = 50.5 m.p.h.) conveying the Hull portion off the 5.40 p.m. down, and the Tees-side passengers off the 5.30 p.m. down. The latter are run through to Middlesbrough, the new train taking the place of the previous 9.45 p.m. *ex*-York. Immediately after the departure of the 5.30 p.m. from London, also, a new express leaves York at 9.30 p.m. for Newcastle, calling at the same stations as the former train. One cannot avoid the reasonable criticism, however, that if new mileage must be run between York and Newcastle in the late evening, it would be much more valuable if the train concerned left at about 8 p.m., in connection with the 7.39 p.m. arrival off the Midland and the 7.40 p.m. off the Lancashire & Yorkshire lines. The 5.30 p.m. *ex*-King's Cross could then resume its time-honoured call at York without an undue access of passengers and luggage. It seems a pity also to start a train from York to Tees-side towns at 10.13 p.m., when the Lancashire & Yorkshire express from Liverpool and Manchester is due in at 10.15 p.m., without making this useful connection.

Similar arrangements are in force in the opposite direction. The 8.0 a.m. from Middlesbrough runs through from York to London, joining at Doncaster the 9.10 a.m. from Hull. From Doncaster to Grantham the combined train runs in 63 min., and from there to London non-stop in 126 min. (= 50·2 m.p.h.), arriving at 1.35 p.m.—an acceleration of 35 min. from Tees-side and 20 min. from Hull. But the 7.50 a.m. from Newcastle, after covering the 30 miles from Northallerton to Clifton Junction in 33 min., and having a portion run off the front of the train into York station, is allowed 4 min. *more* than previously to run non-stop from York to Peterborough, instead of making a 4-min. intermediate halt at Doncaster—really equivalent to some 11 or 12 min. more

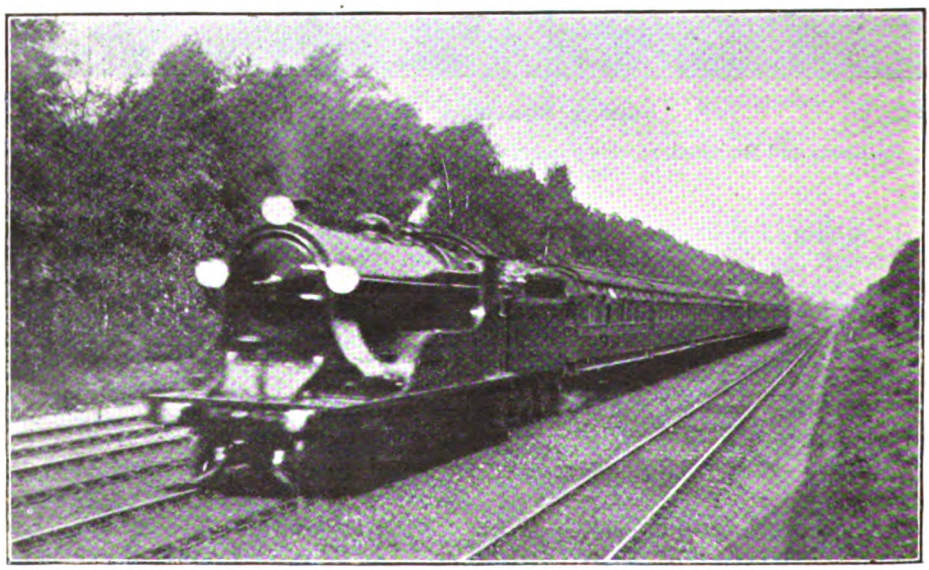


Photo.] LONDON & SOUTH WESTERN RAILWAY. [*K. A. C. R. Nunn.*

Waterloo–Bournemouth express passing Oatlands Park. 4-6-0 engine, No. 460. (4-cylinder 6 ft. 7 in. class prior to rebuilding).

Digitized by Google

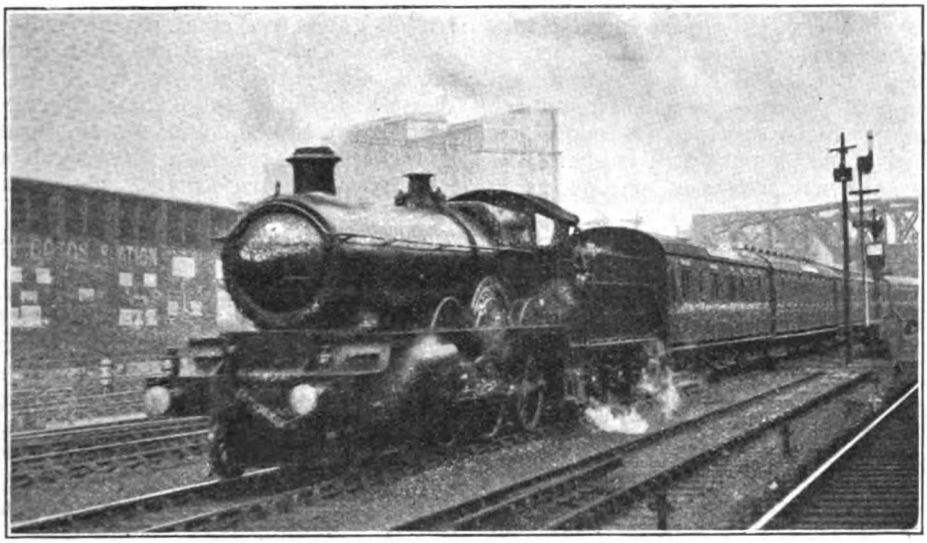


Photo.] GREAT WESTERN RAILWAY. [*P. S. A. Berridge.*

South Wales express leaving Paddington: 4-6-0 four-cylinder engine, No. 4013, "Knight of St. Patrick." The three-position signal can be seen on right-hand side of picture at "all-clear."

in actual running time. Consequently, with a lighter load, no stop at Doncaster and no passenger stop at York, the London arrival is exactly the same as before. For so important a train, this seems a poor arrangement, as on the basis of its previous average running at least 25 min. could have been cut from the York-London times in these circumstances. The difficulty, of course, is the preceding 9.35 a.m. express from Leeds, with its numerous calls, but surely the latter train could either be run 10 min. later, in order to allow the Newcastle train through Doncaster first (in which case it might be booked into King's Cross at 1.45 p.m.), or else the Newcastle train could be started at 8.15 a.m. instead of 7.50 a.m., with the relieving 7.42 a.m. train making all the *en route* connections to York? As it is, the Newcastle express will have to crawl behind the Leeds train all the way from Doncaster to Peterborough, the allowance for the 112 miles from York (now the longest non-stop run on the G.N.R.) being no less than 157 min. Indeed, for the 49·6 initial miles to Retford 77 min. are allowed!

Among other alterations the through Harrogate expresses are diverted to run *via* York instead of Church Fenton, taking up the running of existing trains between York and Harrogate. The down train leaves King's Cross at 1.40 p.m., as heretofore, being somewhat expedited to Doncaster in spite of an additional call at Retford, but the up train is now due in London at 4.15 p.m., forming a new express from York at 12 noon to Doncaster, Grantham, Peterborough and London only. Now that it is possible, by the way, to leave Newcastle at 9.53 a.m., and connect at York with this Harrogate train, not to mention the additional convenience of luncheon-car accommodation, one can foresee a considerable diversion of passengers from the 10.5 a.m. Newcastle-London express, which still continues its terribly leisurely journey, reaching London three-quarters of an hour later. Of other trains, the 5.0 p.m. *ex*-King's Cross is expedited to a 30-min. run between Hitchin and Huntingdon (= 54 m.p.h.—now the fastest Great Northern Railway schedule), and the 10 a.m. from Cambridge also makes a 50·4 m.p.h. run between Hitchin and Finsbury Park, in 35 min. These changes indicate a progressive movement of real acceleration, on which the Great Northern Railway management is to be congratulated.

Of other companies, the London & South Western issued a new time-table on

Digitized by Google

November 16 last, the improvements in which relate mainly to the electric suburban services, which are still further increased. But one is glad to note a continuance of the really excellent main line services which operated through the summer, Bournemouth still enjoying the series of hourly expresses at 9.30, 11.30 a.m., 12.30, 1.30, 2.30, 4.30, 5.30, 6.30 and 7.30 p.m. *ex*-Waterloo, with a correspondingly ample provision in the opposite direction. The Great Eastern Company has also been amplifying its suburban services, and in the evening "business" hours has now reached the somewhat unique total of 68 steam-hauled trains on the up and down "suburban" lines alone in the two hours between 5 and 7 p.m. It must be remembered that these are 15 to 17-coach set trains, each seating nearly 1,000 people, and that, as they are divided between the Enfield and Chingford routes, the junction at Hackney Downs North must be operated constantly between trains without causing delay. From my modest acquaintance with signal-box operation during the railway strike I do not envy the signalman concerned his task during this period.

It is now high time for me to pass on, in accordance with established custom, to my best runs of the year just expired, and one return trip, made while I was actually in course of inditing the present article, stands to such an extent head and shoulders above all others that it will suffice amply to "fill the bill." Great Western 4-cylinder 4-6-0 "Stars" were the engines concerned, and "star turns" their performances were, in very truth. In fact, the return journey was in some respects the most amazing example of running that I have ever yet been fortunate enough to record. London to Swansea was the course, and the 8·45 a.m down and the 5·30 p.m. up expresses were the trains concerned. The former takes quite a substantial load, consisting on this occasion of eleven assorted bogie vehicles, weighing 335 tons empty and about 350 tons with passengers. No. 4007, *Rising Star*, was the engine, and the running was excellent, without being in any way phenomenal.

Despite thick mist and drizzle in the early stages, we passed Southall, 9·1 miles, in 13 min. 5 sec.; Slough, 18·5 miles, in 22½ min.; Maidenhead, 24·2 miles, in 28 min. 10 sec.; Twyford, 31 miles, in 33¾ min.; and reached Reading, 36 miles, in 5 sec. over 40 min., or 1 min. early. Speed rose to 62½ m.p.h. from West Drayton to Slough, fell to 60 at Maidenhead, and rose again to 65 beyond Twyford. A fine re-start was then made, Pangbourne, 5·5 miles, being

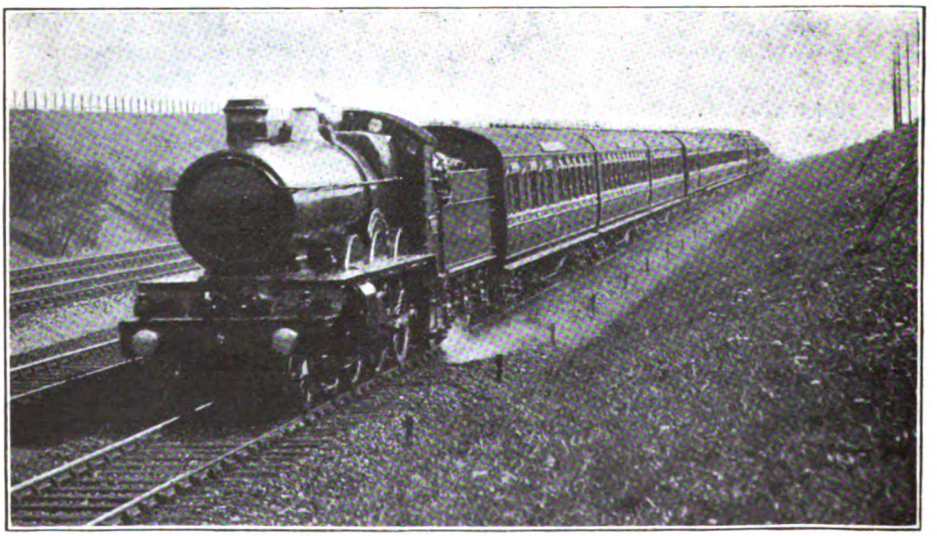


Photo.] GREAT WESTERN RAILWAY. [*R. W. Cole.*

Down "Riviera" express between West Drayton and Langley. 4-6-0 four-cylinder locomotive.

Digitized by Google

passed in 7 min. 35 sec.; Cholsey, 12·5 miles, in 14 min. 10 sec.; and Didcot, 17·1 miles, in 18 min. 40 sec.; speed having risen at Goring to 65 m.p.h. After this speed was quite justifiably eased, and fell to 57½ m.p.h. by about Uffington; Wantage Road, 24·4 miles, was passed in 26 min.; Uffington, 30·5 miles, in 32 min. 25 sec.; and Shrivenham, 35·6 miles, in 37 min. 40 sec. At Highworth Junction we suffered a long check to 40 m.p.h., and at Wootton Bassett speed was reduced to 36 m.p.h., but for all that we passed Swindon, 41·3 miles, in 44 min. 35 sec. (43¾ min. net), and Wootton Bassett, 46·9 miles, in 51½ min. On the falling grades (1 in 300) to Little Somerford we touched 71½ m.p.h., and then went up the 9 miles at the same inclination to Badminton at a sustained minimum of 50 m.p.h., passing the former station, 53·7 miles, in 58 min. 40 sec., and the latter, 64 miles, in 70 min. exactly, or 68 min. net. From there down past Sodbury the most moderate speeds were run, not exceeding 56 m.p.h., and adverse signals between Winterbourne and Stoke Gifford brought us down to 20 m.p.h. for a full mile, while the passage of the Severn Tunnel was painfully slow, the 7 min. allowance between East and West Boxes being rigorously observed. So we took 15 min. 25 sec. for the 11·7 miles from Badminton to Stoke Gifford, 18¼ min. for the 11·9 miles thence to Severn Tunnel Junction, and 13 min. 20 sec. for the final 9·8 miles into Newport, where we arrived exactly on schedule time, all delays included. Obviously in these circumstances the 97·4 miles from Reading to Newport could have been compassed easily in the old time of 107 min., instead of the present 117 min., despite the 350-ton load.

Continuing from Cardiff with a 360-ton train we had a 2-cylinder 4-6-0, No. 2941, *Easton Court*, and enjoyed also the luxury of a "Flower" 4-4-0 piloting—No. 4100, *Badminton*. The start was leisurely, as we took 7 min. 20 sec. to St. Fagan's (4·1 miles slightly uphill), and 11¼ min. to Peterston, 6·8 miles, but then matters improved a little, as we touched 47½ m.p.h. on the level 1¾ miles past this station, and went up to Llanharan (5 miles' ascent, steepening to a final 1¼ miles at 1 in 106) at a minimum of 34 m.p.h., passing that station, 13·5 miles, in 20 min. 55 sec. On Pengoed bank (1 in 138–157, 3¾ miles), we reached 71½ m.p.h., covering the 6·8 miles from Llanharan to Bridgend in 6½ min., and then mounted the 4·1 subsequent miles to Stormy Siding (including 2¾ at 1 in 132–163, on which the minimum rate was 47½ m.p.h.) in 5 min. 5 sec. To my unbounded astonishment, the descent of Pyle bank (3½ miles at 1 in 93–139) produced a maximum rate of no less than 80½ m.p.h., the 8 miles from Stormy Box to Port Talbot being covered in 7 min. 5 sec., and the 5·6 miles on to Neath, where we slackened with exemplary caution to 25 m.p.h. round the curves, in 5 min. 55 sec. This made a total of 38 miles in 45½ min. On the 1 in 99–88 ascent past Skewen we accelerated to 33 m.p.h., and running cautiously down to Landore, completed the 45·8 miles from Cardiff, with a very slow stop, in exactly 56 min., or 2 min. under schedule. Had the start to Llanharan only been of the same quality as the succeeding work, we should have achieved quite a record run.

But it is the return journey that demands the monopoly of attention. From Swansea No. 3391, *Dominion of Canada*, with a six-coach train weighing in all 185 tons, would have done well but for excessive caution downhill, as witness minima of 34½ m.p.h. on Llansamlet bank (2 miles at 1 in 91–106), 38½ on Pyle bank—a good figure this, for a 4-4-0—and 47½ on Pengoed bank. But for the reason given we took 14 min. to Neath, 7·8 miles; 33 min. 25 sec. to Stormy Box (21·4 miles) and 37 min. 50 sec. to Bridgend, 25·5 miles; 45 min. 40 sec. to Llanharan, 32·3 miles, and 57 min. 20 sec. to Ely, 43·4 miles. Thus, even without the signal checks which eventuated, we should barely have kept time into Cardiff. Then *Evening Star* came on to the train, and we fairly began to "move." A sustained speed of 66 m.p.h. between Cardiff and Newport was a good foretaste of what was to follow, although signal checks before Newport prevented any better time than 16 min. 50 sec. between the two towns. But Marshfield, 6·5 miles, was passed in the remarkable time of 7 min. 55 sec.

Nothing short of detailed tabulation could do justice to the running between

Digitized by Google

Newport and Reading. Another extraordinary start was made from Newport—3·8 miles in exactly 5½ min.—the speed of 66 m.p.h. already reached being rudely cut short by the first of the signal checks—at Magor—which provided almost

G.W.R. 6.56 P.M. NEWPORT–READING.

Engine: 4-cyl. 4-6-0 No. 4002 *Evening Star.*
Load: 6 8-wheeled bogies.
Empty: 179 tons. Loaded: 185 tons.

Distance.	Stations.		Time.	Max. & Min. Speeds.
Miles.			Min. sec.	m.p.h.
0·0	Newport	dep.	0 00	—
3·8	Llanwern.. ..	pass	5 30	66
7·4	Magor	,,	9 55	20*
9·8	Severn Tunnel Jc.	,,	14 35	30†
10·9	,, ,, W.	,,	16 00	—
15·3	,, ,, E.	,,	23 00	34½
16·7	Pilning	,,	24 20	38½
				47½
20·3	Patchway ..	,,	32 05	5*
21·7	Stoke Gifford Jc.	,,	34 05	—
23·5	Winterbourne ..	,,	36 25	—
24·9	Coalpit Heath ..	,,	37 55	59
28·8	Sodbury	,,	41 45	62½
33·4	Badminton ..	,,	46 25	57½
				70½
39·2	Hullavington ..	,,	52 55	10*‡
43·7	Little Somerford	,,	58 10	71½
46·4	Brinkworth ..	,,	60 30	69
50·5	Wootton Bassett	,,	64 30	50†
				68
56·1	Swindon ..	,,	70 15	20*
57·0	Highworth Jc. ..	,,	72 40	10*
61·8	Shrivenham ..	,,	78 45	68
66·9	Uffington ..	,,	82 55	75
69·5	Challow	,,	85 00	75
73·0	Wantage Road ..	,,	87 40	79
76·9	Steventon ..	,,	90 40	80½
79·7	Foxhall Junction	arr.	93 35	Stop.
		dep.	94 05	*
80·3	Didcot	pass	95 55	—
84·9	Cholsey	,,	101 10	64½
88·7	Goring	,,	104 40	66
91·9	Pangbourne ..	,,	107 35	64
94·8	Tilehurst ..	,,	110 20	67
97·4	Reading	arr.	113 30	—

* Signal Check. ‡ Two checks to 10 m.p.h.
† Service Slack.

throughout the journey really overwhelming odds against the driver's enterprise. Following Severn Tunnel Junction service slack came the passage of the tunnel, the end-to-end schedule being again observed with minute care, and succeeded by a recovery up the 1 in 100 to Pilning from 34½ to 38½ m.p.h. No. 2 check occurred at Patchway, where we were all but stopped, but, getting away grandly from Stoke Gifford, *Evening Star* was soon doing a mile-a-minute *up* the 1 in 300 to Badminton, increased to 62½ m.p.h. at Sodbury, and only falling to 57½ in Sodbury Tunnel through the greasiness of the rails. Just as we were getting well under way on the 1 in 300 from Badminton we ran up against No. 3 check—a double-barrelled affair of 10 m.p.h. at each end of Hullavington Station—but the concluding 4 miles of the descent sufficed to produce a maximum of 71½ m.p.h. at Little Somerford. After the slack at Wootton Bassett came another of *Evening Star's* peerless accelerations—to 69 m.p.h. *up* 2½ miles at 1 in 660 and along the subsequent 1¾ miles of level—and then we were for the fourth time cruelly checked, to 20 m.p.h., right through Swindon, and to 10 at Highworth Junction. Nothing daunted, our driver—whose name, to my great regret, I had no time to enquire on arrival at Paddington—now fairly let himself go. Accelerating to 68 m.p.h. on the level to Shrivenham, on the faint descent thence to Didcot—mostly 1 in 754—we reached 75 m.p.h. at Uffington, 79 at Wantage Road, and no less than 80·3, sustained for at least 3 miles, at Steventon. Does any up express ever get a clear road through Didcot? If so, this unique event never falls to my lot when timing, and, sure enough, we were not only slacked but stopped dead at Foxhall Junction. The stop lasted 30 sec., and, with another characteristic start, we completed the 17·7 miles on to Reading in 19 min. 25 sec., start-to-stop.

Now the most amazing feature of this run is that, despite two 20 m.p.h. signal checks, three to 10 m.p.h., one to 5 m.p.h., and one dead stand, we had actually *gained* 1½ min. on the 115-min. schedule from Newport to Reading! It is practically impossible to estimate what the net time was—obviously with no checks we should not have done anything like such fast running—but, as nearly as I can arrive at a figure, it would be exactly "even time," *i.e.* 97½ min., for the 97·4 miles, including the customary slacks at Severn Tunnel Junction and Wootton

Digitized by Google

Bassett, and the full 7 min. time through the Severn Tunnel itself, which involves a loss of fully 3 min. and perhaps more on pre-war average running. In any case the actual unchecked running was between 16 and 17 min. faster than the present schedule of the train.

After Reading we were unfortunately just behind the train reaching Paddington at 9.20 p.m. from Oxford, and our exploits, in view of such magnificent driving, were tragic rather than amusing. Immediately after starting we got signals on slightly, and then worked up to 66 m.p.h. at Twyford, shortly after which station we were checked to 45; another maximum of 66 was cut short by a check to 50 at Maidenhead. At Burnham Beeches we were doing 69, only to be pulled up to 15 at Slough, while a last effort of 60 at Southall was succeeded by a string of checks all the way to Paddington, where we arrived 45 min. 20 sec. after leaving Reading, instead of, as should have been the case, in something less than "even time." We had left Newport 5 min. late, and Reading 4¼ min. late, all of which, and more, we should have made up on the 42 min. schedule to London on the basis of such running. One cannot avoid the reflection that it ought to be possible to work so important an express as this with far less in the way of intermediate delays than we suffered on this occasion—there were, in point of fact, eight signal checks between Cardiff and Reading, from varied causes, and nine on the London side of Reading, from the train ahead of us—but the fact of their happening only throws into bolder relief one of the finest examples of locomotive driving in face of difficulties that it has ever been my pleasure to record.

A SCOTTISH RAILWAY SCENE.

"Mountain and mist, lone glen and murmuring stream,
The shaggy forest and the grey hillside."

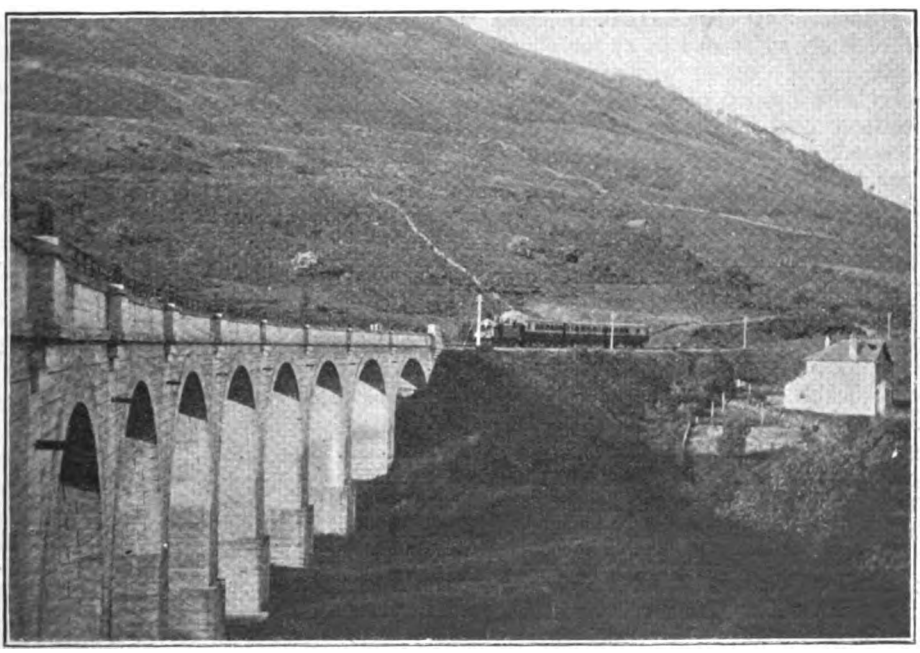
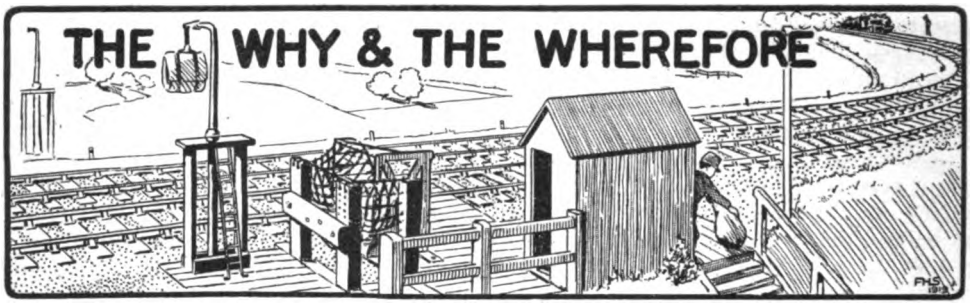


Photo.] CALEDONIAN RAILWAY. [*Tom. M. L. Neish.*

A picturesque view of Lochearnhead Viaduct (Perth–Balquhidder section), with train from Dundee West approaching.

Digitized by Google



Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which, published in April, 1919, is out of print but a new one is in preparation, in readiness for publication in April, 1920.*

Steep Inclines Worked by Adhesion.

From St. David's, Exeter, to Queen Street Station the gradient is 1 in 37. This is exceeded in severity by two miles at 1 in 36 on the Ilfracombe branch; while there are several instances of 1 in 37 and even 1 in 33 on various lines. Thus, the Oldham incline of the Lancashire and Yorkshire Railway is at 1 in 27 for about three-quarters of a mile; while the North Pembrokeshire branch of the Great Western Railway also includes this gradient. Furthermore, on the North British Railway the Commonhead incline is at 1 in 23 for 440 yards, 1 in 25¾ for 380 yards, 1 in 27 for 550 yards, and 1 in 31 for 650 yards; while the Causewayend incline includes 1 in 23 for 860 yards. On the goods line to Kirkcaldy Harbour on the same railway, the gradient is 1 in 20 for 600 yards. There are also steeper inclines worked or assisted by cable haulage.

[Reply to Cadet L. H. FAIRTLOUGH.]

Some Terminal Station Queries.

Original dates of opening of the termini to which you refer were as follows:—London Bridge (London, Brighton and South Coast), 1837; Fenchurch Street, 1840; Pimlico (Victoria), 1860; Waterloo (Windsor side), 1862; Charing Cross, 1864; Cannon Street, 1866; Liverpool Street, 1874. Various subsequent extensions have been made which we cannot afford space to detail, in many of these cases. Present number of platforms:—Waterloo, 21; Liverpool Street, 18; Victoria (London, Brighton and South Coast), 9, equivalent to 18 by central cross-over roads; London Bridge (London, Brighton and South Coast), 11; Cannon Street, 9; Victoria (South Eastern and Chatham), 6; Charing Cross 6; Fenchurch Street, 5. You can obtain all information of this character from the RAILWAY YEAR BOOK.

[Reply to "SUTTONIAN."]

Painting of Caledonian Railway Locomotives.

You are correct that on this railway engines for either goods or passenger traffic may be painted black or blue, the distinction being, substantially, that engines which may be used on passenger trains, including Westinghouse-fitted 0–6–0 locomotives, are painted blue, unless equipped with condensing apparatus for working over the Glasgow underground lines, in which case 0–4–4 and 4–4–0 tank and other engines are usually painted black. As you point out 0–8–0, 2–8–0, 0–8–0 T. and 0–6–0 T. are generally painted black, whether fitted with Westinghouse brake or not, together with 0–6–0 locomotives having steam brake only, and the condensing tank engines, other classes being blue.

[Reply to W. L. KENNING.]

West Somerset Mineral Railway.

This line is 11½ miles in length, and the Ebbw Vale Steel & Iron Company are under obligation to work it for 51½ years

Digitized by Google

from March 25, 1868, with a minimum guarantee. Traffic has been suspended since 1898, the Ebbw Vale Company accepting their liability for the minimum guarantee of £5,575 per annum and other obligations. During the war the rails were taken up and sent overseas. Application was made to Parliament during 1919 in respect of certain provisions of the agreement in view of conditions created by the war. The railway was described in THE RAILWAY MAGAZINE many years ago.

[Reply to W. S. M. R.]

Maximum Speed Round Curves.

The relation between the radius of a curve and the maximum permissible speed over it is governed by the super-elevation of the outer rail. This is usually calculated by the formula: $S = G \times \frac{V^2}{1{\cdot}25_r}$, where S = super-elevation in inches, G = gauge in feet, v = velocity in miles per hour, and r = radius of curve in feet. The outer rail must be raised above the level of the inner rail by the amount thus calculated for safe running at the speed used in the formula.

[Reply to A. DE Q. MEARS.]

Great Northern Railway and London, Brighton and South Coast Railway "Atlantics."

There is no material difference in design between these two types as a whole, save in the matter of externals, and also in that the London, Brighton and South Coast Railway engines have the larger cylinders, *i.e.*, 19 by 26 in., against 18¾ by 24 in. in the non-superheater engines, and 21 by 26 in., against 20 in by 24 in., in that of the superheater classes. We do not attempt to dogmatise as to which of the two companies has the "best" engines.

[Reply to I. J. P.]

Locomotive and Carriage Works.

Crewe is the largest works in the United Kingdom concerned only with locomotive construction and repair and with general railway engineering work, the carriage and wagon works of the London and North Western Railway being respectively at Wolverton and Earlestown. At Eastleigh the London and South Western Railway has separate locomotive and carriage and wagon works, but together they are not so extensive as is Crewe.

[Reply to F. G. C. HENWOOD.]

"Limited" Expresses.

"Limited" was a title originally applied to certain trains in view of the fact that their accommodation was limited to a certain maximum, in order to keep down the weight of these trains, and thus allow of higher speeds being run. This may have been the case at the inception of the 10.30 a.m. "Cornish Riviera" express of the Great Western Railway, but is no longer so, and the designation of "limited" has long since been abandoned in regard to this train.

[Reply to I. J. P.]

Great Northern Railway in Derbyshire.

There is no direct connection between the stations usually known as Basford and Ilkeston *Junction*; probably you mean between Basford and Ilkeston, which is Great Northern property, with intermediate stations at Awsworth and Kimberley. Ilkeston certainly is a junction, for the Heanor branch, but Ilkeston Junction is the name of the Midland station on the Erewash Valley line, at a much lower level, where the short terminal branch to Ilkeston leaves the main line.

[Reply to "SINGLE-WHEELER.]

Audible Signalling on the Great Western Railway.

You are correct in associating the bell on the driver's side of numbers of Great Western Railway engine cabs with the audible signalling arrangements on that line. We have not sufficient space to describe this at length, but may say that the bell is operated by means of a collecting shoe on the engine and a "ramp" in the four-foot, which becomes electrified when the signal to which it refers is at danger.

[Reply to H. W. GREANY.]

Underground Enterprises.

THERE is no proposal at the moment to build a new station at Holborn, on the Central London line, connecting with the Piccadilly Tube. It is not certain at present when the Ealing and Shepherd's Bush extension will be opened. The question of providing and the situation of the platforms is a matter for the Great Western Railway authorities. Work has not been commenced on the Central London extension from Shepherd's Bush to Gunnersbury.

[Reply to L. C. N.]

Digitized by Google

2-8-0 R.O.D. Locomotives.

A number of these engines were completed after the date of the Armistice, and as it was recognised that many of them would probably be taken over by British railways special fittings, such as the Westinghouse brake, were in some cases, omitted, so that the purchasing company could fit their own equipment. All that went overseas, and many of the others, were, however, fitted with the compressed air brake.

[Reply to A. I. J.]

Midland Railway Locomotives.

There are no eight-coupled engines owned by the Midland Railway, but one of the 2–8–0 engines designed and built at Derby by the Midland for the Somerset and Dorset Joint Railway has for some time past been working on the former line between Brent Sidings, Cricklewood, and Wellingborough. Largest and heaviest 0–6–0 engines on the Midland Railway are, of course, the superheated "3835" series.

[Reply to L. T. HART.]

Slip Coaches.

Special arrangements require to be made in the case of vacuum-fitted slip brake coaches for sealing the vacuum on both the slip portion and the last vehicle of the main train at the moment of slipping. Otherwise both portions of the train would come to rest immediately. We have not the space available to describe these arrangements in detail. Similar provision must, of course, be made in the case of Westinghouse-fitted stock.

[Reply to H. F. S.]

Midland Locomotives.

New engines are now in course of construction for the Midland Railway, *e.g.*, the superheated 0–6–0's of the "3835" series. Possibly the large numerals on Midland tenders may lead to some confusion, when, owing to repairs becoming necessary, engines and tenders are incorrectly "mated," but we have not heard of any particular difficulties arising in this way.

[Reply to C. C. HUNT.]

Midland Railway "Singles."

We are informed by Mr. Roderic T. Harvey, Assistant Locomotive Superintendent of the Midland Railway at Kentish Town, that the first of the 95 4–2–2 engines on this railway has now been broken up. This was No. 686, formerly stationed at Kentish Town. Several others of this type are now awaiting heavy repairs, and it is possible that they may share the same fate.

[Further reply to "SINGLE-WHEELER."]

Midland Train Services.

THERE is no 9.35 a.m. train from St. Pancras to Manchester. There is a semi-fast to Leicester at 9.30 a.m., and a Manchester express at 10.15 a.m. (calling at Leicester, Derby, Miller's Dale and Chinley). But, seeing that you saw the train concerned leave St. Pancras why not consult the time-table at the station yourself and thus save us the space occupied in replying to such a query?

[Reply to "RADLETT."]

Large Railway Stations.

There can be no comparison between Carlisle and Waterloo stations, as the former involves consideration of the avoiding goods lines and the various goods yards of the district to appreciate its traffic importance, while the latter is a terminus concerned only with the movements of passenger trains on traffic entirely unlike anything which Carlisle can produce.

[Reply to F. G. C. HENWOOD.]

London and South Western Railway Engines.

We believe that the numbers 2069-2072 and 2119-2124 are to be allotted to 2–8–0 engines of the R.O.D. (Great Central) design. These will be prohibited, on account of weight, from running over the sections of line already barred to the various 4–6–0 types. We believe that none of the 5ft. 7. in. Urie 4–6–0 engines are yet in service.

[Reply to "WORGRET.]

Rebuilt 4-4-0 Engines on the London and South Western Railway.

Mr. Urie has, as yet, designed no 4–4–0 engines for the London & South Western Railway, but has rebuilt with superheaters the whole of the last batch of Drummond 4–4–0's (463–472 inclusive) and a small number of the penultimate "415" class.

[Reply to D'ARCY EDMONDSON.]

Folkestone Landslip.

The South Eastern and Chatham Railway main line between Folkestone Junction and Dover was entirely out of use from the time of this landslip until the

Digitized by Google

recent reopening, and all the Dover traffic during that period was worked *via* Canterbury, Folkestone Junction was, of course, treated as a terminal station.

[Reply to J. D. THOMSON.]

Midland (London, Tilbury and Southend Section) Railway Rolling-Stock.

We are wholly unable to divine the intentions of the Midland Railway in regard to the painting of this stock. It is in any case improbable that the expense of repainting would be resorted to when revarnishing would be sufficient to keep the stock in good running condition.

[Reply to "MIDLANDITE."]

Waterloo Junction, South Eastern and Chatham Railway.

Waterloo Junction is situated on the South Eastern and Chatham Railway main line between Charing Cross and London Bridge, and a large service of passenger trains, therefore, runs through it, of which a good proportion of the local trains stop.

[Reply to "SUTTONIAN."]

London, Brighton and South Coast Railway Locomotives.

As far as we are aware 0–6–2 tank engines were the only ones contributed to the R.O.D. stock of British locomotives in France. The Billinton 0–6–0 tank engines of the No. 100 class are not superheater fitted, though they have feed-water heaters.

[Reply to E. F. B.]

Some Romford Queries.

No regular trains, either passenger or goods, are worked over the connecting spur between the Great Eastern and Midland lines at Romford. As to the gradient down to the Great Eastern Railway goods yard at Romford we have no definite information, but we believe it to be about 1 in 70.

[Reply to G. E. CASTELLAN.]

Largest Signal Box, Great Southern and Western Railway.

Largest signal cabin on Great Southern and Western Railway is at Limerick Junction, where the frame consists of 78 levers, 70 of which are working and 8 are spare.

[Reply to A. W. G.]

Great Northern Locomotives.

No 0–8–0 or 0–8–4 tank engines are employed by the Great Northern Railway, but there is a considerable number of 0–8–2 tanks, most of which are employed on mineral service in the Nottinghamshire district, some being now superheated.

[Reply to "SINGLE-WHEELER."]

London Railway Termini.

The stations you mention were opened in the years noted as follows, the present numbers of platforms (main stations only) being stated in brackets:—Paddington, 1838 (12); Euston, 1837 (15); St. Pancras, 1868 (7); King's Cross, 1850 (11); Marylebone, 1899 (4).

[Reply to "SUTTONIAN."]

Wimbledon and Sutton Railway.

This line is promoted by a separate company, but both the London and South Western and the Metropolitan District Railway are interested in the scheme, and will probably undertake its working when completed jointly, passenger trains being electrically worked.

[Reply to "SUTTONIAN."]

Numbers on Rail Chairs.

Your reference to the numbers on rail chairs is very vague; it might refer to the number of the pattern from which the chair was cast (as a large foundry, with a chair contract, might be using a number of patterns simultaneously), or the year of manufacture, or the month of manufacture.

[Reply to H. F.S.]

Kettering-Leicester Section, Midland Railway.

We know of no present intention to widen north of Kettering on the part of the Midland Railway, although the preparations in hand between Desborough and Market Harborough doubtless have this in view as an ultimate probability.

[Reply to J. G. B.]

Platform Lengths.

Longest platform at Victoria, London, Brighton and South Coast Railway, is 1,500 ft. Longest platform at Waterloo, London and South Western Railway, is 860 ft. See RAILWAY YEAR BOOK, page 44.

[Reply to "POLAR STAR."]

Locomotive Colours on the Great Northern Railway (Ireland).

So far as we know black is likely to remain the permanent colour of the locomotives of above line, with the buffer-beams vermilion, as at present.

[Reply to H. F.]

Digitized by Google

Numbers of Great Western Railway Locomotives.

As a war measure many engines dealt with in the shops had the numbers painted on the cab side sheets instead of the usual brass number plate.

[Reply to "BONAVENTURA."]

"Single-Drivers" on the Great Northern Railway.

All the 2–2–2 and 4–2–2 engines on the Great Northern Railway, of both the Stirling and Ivatt types, have now been withdrawn from service.

[Reply to D'ARCY EDMONDSON.]

"Claughton" Class Engines, London and North Western Railway.

All the engines of this type have a uniform weight in working order (without tender) of 77¾ tons.

[Reply to "PRECURSOR."]

4-6-0 Express Engines, Great Eastern Railway.

None of the new 4–6–0 series (Nos. 1541 to 1560), now constructing by Messrs. Beardmore, of Glasgow, are yet in service.

[Reply to GEOFFREY CHRISTY.]

Largest Signal Box, Great Western Railway.

Birmingham North, 188 working and 36 spare levers. See RAILWAY YEAR BOOK, page 149.

[Reply to "POLAR STAR."]

Locomotive Dimensions.

We do not undertake to give lists of dimensions. See rules at the head of these columns.

[Reply to J. RATCLIFF.]

2-8-0 Mineral Engines, Great Northern Railway.

Latest of this series to be put in service is No. 473.

[Reply to GEOFFREY CHRISTY.]

"SLIPPING" AT ROCHDALE.

LANCASHIRE & YORKSHIRE RAILWAY.

Coaches in the act of being "slipped."

[The fact that the locomotive is one of the well-known 2–4–2 tank engines and bears express passenger-train headlights renders the photograph of special interest.

Digitized by Google

PERTINENT PARAGRAPHS

Post-War Train Services.

DURING the past year there has been a steady improvement both in regard to numbers of trains and in their speed on all railways, as duly chronicled in the RAILWAY MAGAZINE, either in Mr. Cecil J. Allen's articles or in the course of editorial reference. In some respects one has to admit to a degree of disappointment in that we have yet to see any close approximation to the pre-war situation; but on the whole we consider that every fair-minded reader will acknowledge that the standard of facilities and speed is now quite a creditable one, though very few of the fastest express train schedules now advertised approach the proved capabilities of the engines now available on the basis of pre-war performance. Many special factors arising from the war still apply, and conditions have changed so radically that we can hardly look for much development in speed beyond that already realised, at least for some time to come. But the year 1919 closes with a commendable degree of speeding up of most of the decelerated schedules of the war period, with a reasonably good service of trains on all main routes, a standard of express running which approaches a 50 mile an hour average on the principal routes, while many of the suburban routes have been supplied with additional trains to an extent which appears, in some instances at least, to be beyond the operating capabilities of to-day.

Arising from the principle of route allocation for passenger traffic between the great centres of population and industry, post-war time-tables present somewhat curious characteristics. Trains which run to certain places are often absent from the tables where one would expect to find them, for the reason that they do not take through traffic, though in other tables they appear for traffic for which they cater. And in order to distribute traffic between various trains it is now by no means unusual to find trains apparently booked to omit essential division and frontier stations, though for locomotive and sometimes for traffic purposes they may call at these stations. In fact, footnotes and other data sometimes give times for arrival and departure at stations which do not apply for through passengers. Thus, the 6.35 p.m. East Coast train from Aberdeen is apparently scheduled to run from Arbroath to a conditional stop at Berwick, and on various lines Bradshaw shows trains which appear to pass without stopping such essential stations as York, Crewe, and even Carlisle. These and other characteristics of post-war train services will, presumably, remain with us for some time to come, and must be accepted as among the features which differentiate post-war from pre-war time-tables.

"Cannon Street Complications" and their Solution.

IN years gone by the South Eastern and Chatham Railway owed much of its old adverse reputation in regard to unpunctual running of trains to the conflicting traffic movements entailed by serving both Cannon Street and Charing Cross with the same trains. It is true that a reputation for slowness and unpunctuality was never fully deserved, and there were worse sinners in this respect among much greater railways, though as the more or less humorous writers of the period followed one another's lead in attributing these characteristics to the poor South Eastern of that day, and let other offenders off scot-free, the public gradually came to believe that the charges were justified. But in so far as slowness and unpunctuality did occur they were undoubtedly vey largely due to the fact that so many of the trains served both Cannon Street and Charing Cross. As a result trains proceeding from London Bridge or Waterloo Junction had, either entering or leaving Cannon Street, to cross nearly every track on Cannon Street railway bridge, and this entailed holding up every other train movement which could conflict.

Many suggestions for remedying the difficulty were made, and we may recall an interesting article on the subject by the late

Digitized by Google

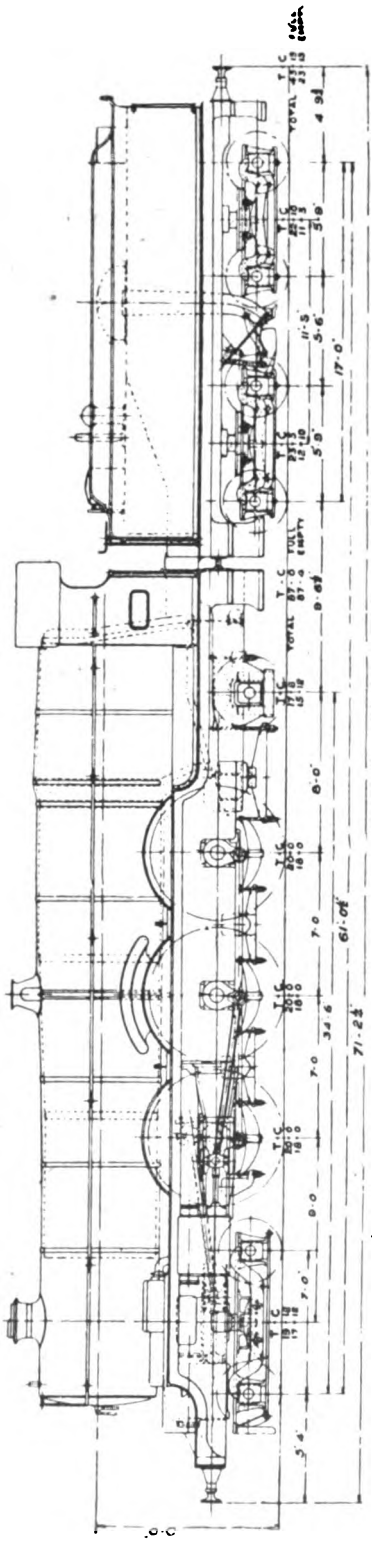


DIAGRAM OF 4-6-2 FOUR-CYLINDER ENGINE No. 111, "THE GREAT BEAR," GREAT WESTERN RAILWAY.

Mr. Charles Rous-Marten; but the only real solution has proved to be the discontinuance of dual-terminal services by the same trains. For years past, therefore, a gradual tendency to confine trains to one terminal or the other has been evidenced, but it is only lately that the principle has been carried to its logical conclusion. Now, however, the situation is that not a single regular train serves both stations, and the various trains are distributed to run to or from one or the other. There are, however, numerous trains running to either terminus so that a change at London Bridge when necessary involves only a few minutes' delay. This applies to local as well as main line trains.

Notable also is the gradual tendency to avoid double-terminal working by one train on other routes, though the traffic difficulties on the London, Brighton and South Coast Railway and the London Chatham and Dover section of the South Eastern and Chatham Railway are not so acute, so that there are still many trains combined or divided at East Croydon, Sutton or Herne Hill.

"The Great Bear."

At the beginning of 1908 considerable public interest was aroused by the appearance of the first locomotive of the 4–6–2 or "Pacific" type on any of the home railways. The engine designed by Mr. G. J. Churchward, Chief Mechanical Engineer, Great Western Railway, was a development of the four-cylinder 4–6–0 engines of the "Star" class already in service, but represented very considerable progress. Appropriately, it was named "The Great Bear," thus indicative of its position as an exceptional member of the "Star" series of engines, but although in many respects it was standard with them the engine, as a whole, was necessarily designed on a very much more ambitious scale.

The boiler, for example, was very much larger than anything hitherto built for an English railway, having a barrel no less than 23 ft. in length, while its maximum diameter at the junction of the taper section with the huge Belpaire firebox, was 6 ft. Heating surface, too, indicated dimensions which exceeded previous practice, the tubes contributing 3,103 sq. ft. and the firebox 158 sq. ft., towards a total of 3,261 sq. ft. provided. The grate area of 42 sq. ft. was also a notable figure, comparing with 27 sq. ft. in the "Star" class engines. This development resulted from the firebox being unrestricted by coupled wheels.

A pair of inside cylinders set in advance of the bogie centre drive directly the crank axle of the leading pair of coupled wheels,

Digitized by Google

while the outside cylinders, placed to the rear of the bogie centre, drive the middle coupled wheels. Piston valves are employed for all cylinders, the four valves being actuated by two inside valve gears of Walschaert type using single eccentrics in place of the return cranks employed for that gear when placed outside the wheels. The gear has been modified so that the inside and outside valve spindles on each side are connected by cross-levers to meet the conditions that adjacent cylinders on either side of the centre line have their cranks at 180 deg. apart. The "Swindon" superheater, then being made standard by Mr. Churchward, is included in the design, but, as is usual in his practice, the high steam pressure of 225 lb. per square inch was adopted.

Cylinders are 15 in. diam., with a stroke of 26 in.; coupled wheels, 6 ft. 8½ in. diam.; bogie wheels, 3 ft. 2 in. diam.; and trailing wheels, 3 ft. 8 in. diam. The wheel-base from centre of bogie to leading coupled wheels is 9 ft.; coupled wheel-base, 14 ft.; and trailing coupled to rear carrying wheels, 8 ft. Total weight of engine and tender in working order is 142¾ tons.

"No. 111" at Work.

Owing to the large dimensions of the engine it has been necessary to confine its working to the London-Bristol section, though its enormous haulage capacity has been extensively utilised on heavy goods traffic, a frequent duty being that of taking an express train in one direction and running a maximum load goods train in the other. Owing to its limitation to a particular section of the line, and to the fact that it has been utilised very largely on the basis of its power capacity rather than of speed, "The Great Bear" has figured to a relatively small extent in records of notable train running. At the same time we understand that it has fully justified its construction in every way, and the main reason why the class has not been multiplied is that, notwithstanding increasing demands, the 4-6-0 engines have been able to fulfil all requirements, even during the high-speed, heavy-load years which preceded war period decelerations. No. 111 has been fitted more recently with a "Swindon" top-feed and other details in accordance with present Great Western standards, and has been painted in the colours now in vogue, but is otherwise substantially as built. As illustrated by the coloured plate presented with this issue of the RAILWAY MAGAZINE, the engine is shown in its present condition, the picture having been prepared on the basis of a photograph recently taken by Mr. F. H. Stingemore.

Station Indicators for Railway Trains.

IT is many years since automatic station indicators for use in railway trains were first tried, and we can well recall the bewildering information which passengers in District Railway trains of twenty years or so ago occasionally received in this way. But although results in those days were not altogether successful, conditions have now so far changed that apparatus of this kind is becoming almost essential. It is not only that an unfamiliar traveller welcomes any assistance of this character, but even regular passengers sometimes "lose their bearings" when a car is overcrowded and no view can be had of station names or characteristic features. In any case announcement of the "next station" enables passengers to prepare for alighting, and may in the aggregate result in the saving of a few of those precious seconds whose loss is a primary cause of overcrowding. Obviously any device of this kind to be used to-day must be electric, and there are possibilities which inventors of the old mechanical period could never have contemplated. Therefore the apparatus which, we understand, is being tested on the Great Northern and City section of the Metropolitan Railway includes a series of panels, one for each station, and bearing also a map of the surrounding thoroughfares with the names of places of public interest, large trading premises, &c., and these panels become illuminated in sequence as the train proceeds stage by stage. In order to meet the conditions created by non-stop working a switchboard in the motorman's or guard's compartment enables desired panels to be illuminated with the words "Not stopping at," and this indication remains visible continuously until that station has been passed. Usually the apparatus will be attached below the roof inside the car so as to be easily visible to all passengers. It is operated by means of a trigger device alongside the track beyond each station designed to avoid risk of "missed" or "double" contacts. On tube lines having a running loop a double series of contacts upon a revolving barrel will control a single series of panels for a complete out and home journey. In other cases reversal must suffice for journeys to and fro. When alternative routes are concerned, as on the Hampstead tube, panels for alternative stations may be divided and illuminated according to the setting of the control switchboard.

Railway Telegraphy and the Great Western Railway.

IN his Presidential Address to the Institute of Electrical Engineers, Mr. Roger T. Smith, Electrical Engineer, Great Western Railway, referred to the association of his railway with the early history of telegraphy and with the Society of Telegraph Engineers, from which the Institution developed. First

Digitized by Google

he pointed out that Cooke and Wheatstone's four and five-needle telegraph was patented in June, 1837, tried in July of the same year between Euston and Camden Town, and installed on the Great Western Railway, between Paddington and West Drayton in 1838, the same year that saw the opening of the first section of the railway itself between Paddington and Maidenhead. This telegraph was extended to Slough four years later.

"Practical telegraphy, that is to say, electrical engineering, started in this country on the railways for railway purposes, and although for public messages the telegraphs had been taken over by the Government before the Society of Telegraph Engineers was formed in 1871, the Society, and its successor the Institution, may with some truth be said to be the child of railway telegraphs. The telegraphs installed on the railways were used among other things for railway messages and for the announcement of the despatch of trains. Mr. Cooke saw that in conjunction with fixed signals the telegraphs could be used to provide an absolute block system on the railways by dividing the line into sections, and, by telegraphing between signal-boxes, to secure that one train only was permitted to be in a section at any one time. On the Great Western the Box Tunnel was worked on Cooke's block telegraph system in 1850.

"The Electric Telegraph Company had already been installing and maintaining telegraphs for all purposes on the railways for some years, and Mr. C. E. Spagnoletti had been working for them on the Great Western Railway, when in 1853 that railway created the post of Telegraph Superintendent and appointed Mr. Spagnoletti to fill it. Mr. Spagnoletti, the first of the railway telegraph superintendents, filled the Great Western post for 37 years, and was the first railway President of this Institution, under its second title of the Society of Telegraph Engineers and Electricians, in 1885. The birth of the telegraphs led to the birth of this Institution, and the name of Mr. Spagnoletti, my predecessor at Paddington, will always be associated with the early developments of electric telegraphy."

Some Incidentals of the Railway Electrification Problem.

On the basis of general economic statements it is now generally admitted that electric traction opens up many practical possibilities. For example, there is no gainsaying the fact that heavy goods and mineral traffic can be operated more effectively, in larger loads, at higher speeds on adverse grades, and by fewer locomotives than by steam traction; while on the passenger side electric traction affords the only satisfactory method of dealing with intense urban and suburban traffic. But in his address above referred to, Mr. Roger T. Smith, as a practical railway officer as well as a leading electrical engineer, directs attention to various other factors which materially influence matters on the traffic side and in view of existing conditions. For example, the loading gauge is usually considered only in regard to limit dimensions of rolling-stock, but, with overhead electric equipment, account has also to be taken of available headway under bridges and through tunnels. Again, heavier goods and mineral trains entail increased strength of draw-gear and probably the employment of continuous brakes, in which connection the problem of the private owner's wagon, itself restricted by conditions at collieries and manufacturing establishments, is rendered more difficult of solution. Furthermore, the length of goods and mineral trains is governed, not by locomotive haulage power, but by the accommodation in lay-by and reception sidings. And on the passenger side intense electric services involve reservation of tracks solely therefor, and unless six running lines are available all steam passenger and all goods and mineral trains, steam or electric, must usually be worked over the remaining tracks.

Economical Haulage and Traffic Possibilities.

Therefore Mr. Smith enunciated the axiom that if mineral and goods traffic is to be hauled electrically under present conditions of size of wagon, strength of draw-gear and capacity of sidings, it must be because it is more economical in the cost of haulage. The same applies to passenger traffic which is without these limitations. Both are also influenced by the fact that higher train totals and increased track capacity can also be realised. In the case, however, of mineral traffic down valleys where gradients are steep, as applies on the Shildon and Newport mineral line electrified by the North Eastern Railway, the saving in locomotives, in locomotive crews and in time, far exceeds any saving in cost of haulage, and railways may confidently embark on the electrification of mineral lines with steep gradients even when electricity is not cheap. The steam locomotive which can haul 1,600 tons on the level cannot haul one-third of this load up a gradient of 1 in 50 at a convenient speed, while within the same load gauge an electric locom tive can be made to haul the 1,600 tons up 1 in 50, or if need be double this load, provided the draw gear is strong enough.

"Electrical engineers, and others, not engaged on railways," continued Mr. Smith,

Digitized by Google

"are at times liable to forget that railways are not run by the engineering but by the traffic department. The traffic department has gradually built up its requirements to suit the needs of the travelling public and the trader, and it is those requirements that the engineer has to meet. In many directions electric traction provides entirely new possibilities which the traffic department has yet fully to realise. To make use of these new methods the traffic department has first to adapt its ideas and habits to the changed conditions, and next to carry the travelling public and the trader with it. No small measure of imagination is required by a railwayman to grasp quite new conditions of service and to do so with the enthusiasm of the propagandist."

Direct *versus* Alternating Current Operation.

MR. ROGER SMITH devoted some attention to the vexed issues of voltage and whether direct or alternating current offers most advantage. "We have in this country examples both of high-pressure direct-current electric traction and of high-pressure single-phase electric traction. Both have been successful, and it is quite possible that under certain conditions as great economy may be obtained by the use of single-phase current, provided that a single-phase supply is obtainable at a price which compensates for the higher efficiency and less cost of the direct-current motor on the train, and the increased losses in the return through the rail with alternating current. But in a majority of cases where economy was a first consideration, careful estimates of both single-phase and high or low-pressure direct-current traction have shown capital and working costs so decidedly in favour of direct current that those responsible for the expenditure had no hesitation in adopting the latter system."

But whether the railways are worked as a whole or as separate concerns, if main line electrification is to be carried out it is necessary that an electric locomotive should work anywhere, and it is certainly desirable that one system should be adopted for the whole country for main line as apart from suburban traction. "So far as our present knowledge goes," continued Mr. Smith, "the railways of the whole country would be more economically electrified by direct current than by alternating current."

"At present there is no need to fix a standard pressure or pressures for direct-current main line working, nor has the matter yet been sufficiently discussed. Presently it will have to be fixed, but nothing has yet been done in the way of railway electrification which anticipates a decision or will prevent it being decided entirely on its merits. On their Manchester and Bury line the Lancashire and Yorkshire Railway have shown that the protected third rail designed by Sir John Aspinall can be used most successfully at 1,200 volts, and it is equally certain that, perhaps with some modification, it will be as successful at 1,500 volts. There are many places where overhead conductors are not desirable and others where they are not possible, and should this type of protected third rail be acceptable the maximum pressure at which it can be run will form the, or one, standard voltage. The fullest consideration will then have to be given as to whether a pressure of, say, 1,500 volts, is high enough for main line electrification or if double this pressure will be needed for overhead equipment. Fortunately, this decision will not have to be taken in a hurry, but if two pressures have to be used for main line electrification, locomotives must be able to use both."

Railways and the Eight-Hour Day.

LIMITATION of working hours is a commendable principle, and no one will argue that the eight-hour day was in any degree unjustifiable; but in railway service the changes entailed thereby have been far-reaching, and the cost of railway working greatly increased. On certain duties, especially signalling and in cases where a 24-hour day was conveniently divided into three 8-hour shifts, the principle was already in vogue, but many traffic duties were well served by two 10-hour shifts, so that the 8-hour system was not easy of adaptation. Moreover, a decrease from 10 hours to 8 hours requires a staff increase of 25 per cent. to realise the same total of working hours, though frequently there is not accommodation for the additional men required to do the same amount of work in 8 or 16 hours, while to complete 10 or 20 hours by means of overlapping or broken shifts is often neither desirable nor practicable without causing other difficulties.

Duties of enginemen and guards introduce another adverse factor, that a part of each duty time is necessarily unproductive—booking on, examining engine, and proceeding from shed to train, returning to shed and booking off, station work, &c.—but this is a constant figure, so that train-working time is correspondingly reduced. As a result it is estimated that about 30 per cent. more men are required to cover a reduction of 20 per cent. in working hours. It is more difficult, too, to arrange duties, as so many could be conveniently planned within 10 hours, whereas the 8-hour day in many instances requires shortening the range of train working, changing enginemen and guards *en route*, and other measures. By reorganisation of train services and duties

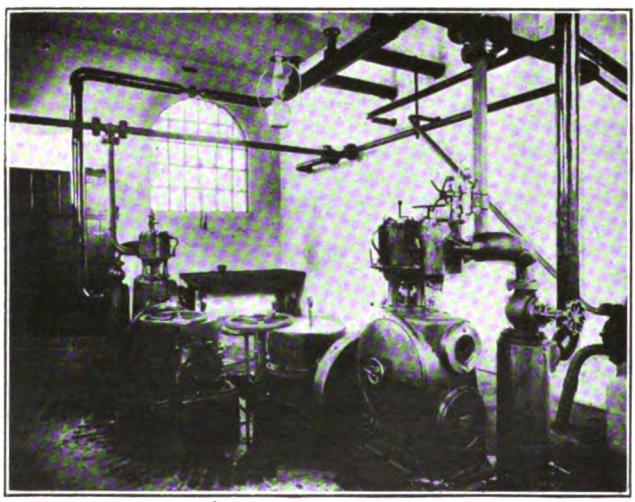
Digitized by Google

and by minor adjustments the situation can be improved, but many further changes will have to be made before the most effective and convenient arrangements can be evolved.

In the railway workshops re-arrangement is more easily effected; and we understand that on several lines complete double-shifting has already been decided upon, if not already in practice.

Water Troughs on the Great Northern Railway.

A READER asks for information concerning the pumping equipment associated with water troughs from which water is picked up while travelling. This is rather too lengthy for reply in our "Why and the Wherefore" pages, but the opportunity may be taken to include here a description of the Great Northern Railway troughs laid down quite recently at Langley, 27 miles from London, in order to divide the long run of 80 miles which previously separated King's Cross from the Werrington troughs north of Peterborough.



ENGINE AND PUMP HOUSE: LANGLEY WATER TROUGHS, GREAT NORTHERN RAILWAY.

A well was sunk in the chalk to a depth of 100 ft., with a bore 11½ in. diam., to a further depth of 300 ft. Water stands normally in the well at a depth of about 12 ft. 9 in. from the surface, the pumps being placed 12 ft. lower down. A pump and boiler house was built over the well and a delivery pipe, 8 in. diam., laid therefrom to a large storage tank having a capacity of 100,000 gallons, built at the top of the railway cutting, about 600 yards distant, which is the highest point in the neighbourhood suitable for the purpose.

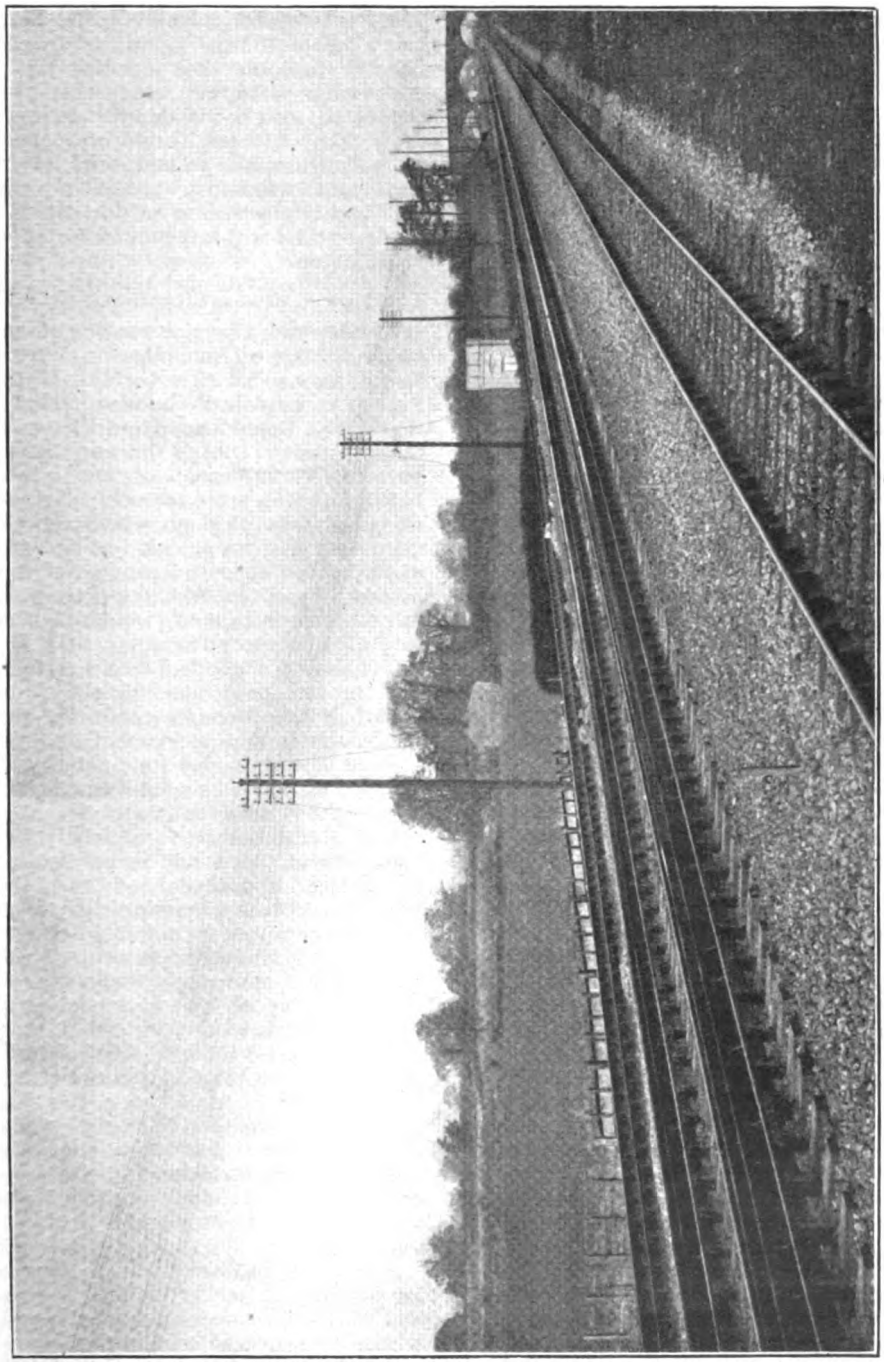
From this large tank the water passes by gravitation to an auxiliary tank of 14,000 gallons capacity, placed opposite the centre of the troughs. Between this auxiliary tank and the troughs the water is controlled by two automatic levelling valves, one to the up and one to the down trough. Each trough is fed at two points situated at one-fourth of the length from each end, and the inlets are arranged so that the incoming water is directed in the length of the trough, and little water is lost owing to the strong flow splashing over the sides.

As the trains follow one another quickly, it is necessary that the levelling valves should be large and act quickly. They are 10 in. diam., balanced for pressure, and so arranged that on the level of the water in the trough being dropped ½ in. they open full and remain full open until the level is again reached, when they close at once. By this means it is possible to refill the trough in 2½ minutes.

The machinery consists of two sets of vertical high lift two-stage 6-in. centrifugal pumps, each of 20,000 gallons capacity per hour when running at 1,250 r.p.m. These are fixed on a platform in the well 24 ft. 6 in. below the surface of the ground. They are driven by two vertical high-speed Sisson steam engines of 25 brake horse-power each when running at 600 r.p.m. These are of the totally enclosed type with forced lubrication. They connect through a flexible bearing to the intermediate gearing, which is of the helical type, running in grease and enclosed in a cast-iron case, with ball-bearings arranged to take both horizontal and vertical thrust. Steam is provided by two locomotive boilers working at 100 lb. pressure, the exhaust steam being utilised for heating the feed-water. Only one set is in use, the other being kept in reserve.

Two troughs only are laid, one on the down fast and the other on the up fast line. The total length of each is 1,800 ft., of which 1,500 ft. is on the level, the ramps at each end being 150 ft. long, graded to correspond with the rails, which at these points are laid in to a compound gradient, varying between 1 in 750 and 1 in 240, till they meet the level of the existing line. The troughs are constructed of creosoted timber, the joints being grooved for a hard wood tongue, thus ensuring a watertight joint, and of a width of 1 ft. 6 in. clear on the inside, with a depth of

Digitized by Google



WATER TROUGHS AT LANGLEY: GREAT NORTHERN RAILWAY.

Digitized by Google

6½ in., the valves on the supply pipes being so regulated as to give a depth of water in the troughs of 5¼ in. They are supported on cast-iron brackets secured to every third sleeper by coach screws.

Woolwich as a Locomotive Building Centre.

THAT Woolwich Arsenal is to become a centre for the construction of locomotive engines and railway wagons raises several important issues. For example, this measure will introduce the State as a competitor in a field of manufacturing industry hitherto supplied exclusively by private enterprise, and in regard to items which have no relation to the recognised activities of the State as a manufacturer.

Moreover, such competition lies between the output of an establishment developed in a very high degree to meet an extreme national emergency and with the full support of the State itself, and that of private enterprise which is subjected to all the influences of the period, favourable or adverse, and yet has to maintain the full responsibilities incidental to commercial manufacture. It is true that, for the time being, locomotive and wagon building firms are largely employed on deferred orders, and although the labour and financial situations are not altogether favourable to the placing of new orders, most such establishments can reckon upon their full output being required for some time to come. It is not, however, altogether clear why an establishment developed to meet an emergency which necessarily had to come to a conclusion should be made the subject of special treatment, and we should have much preferred a scheme wherein national workshops were co-opted to assist private enterprise, as sub-contractors or in some other suitable way, than that the State should directly enter the market both as manufacturer and as seller. The course suggested would have assisted towards realising the required accelerated and increased output, while at the same time keeping the business aspects in the hands of the existing firms, whereas the present scheme introduces the State as a direct competitor with private enterprise, while itself free of many of the difficulties which handicap commercial manufacturing firms, and with the advantage of entirely up-to-date and complete plant.

As we understand the situation, Woolwich is not the only place where premises, plant and personnel have become excess since the termination of active hostilities; but much of the equipment and material might advantageously be distributed where it is required, with due acknowledgment that much of it must continue to be in excess of demands for some time to come, while as the great staff now calling for consideration has been largely gathered from other districts and other industries, it may advisedly be expected to re-distribute itself more or less from whence it came. The State has many responsibilities; but we do not consider it desirable that it enter into direct competition with any established industry conducted by private enterprise, and when the reasons advanced are more particularly on philanthrophic grounds and to meet a local and temporary condition which it was known must occur in due course, there appears to be still less ground for approving of this step.

The New Railway Situation.

ADDRESSING a special meeting of members of the House of Commons on Wednesday, December 10, Sir Eric Geddes, Minister of Transport, explained the new railway situation which would exist from the opening of the new year. During the war the railways were under the control of the Government, but in fact they were self-controlled, because the machinery through which the Government exercised its powers was placed in the hands of the general managers of the companies. From January 1 the control, in so far as it now existed, would be exercised by the Ministry of Transport, and the financial checking, which had been so ably carried out by the companies on each other on behalf of the Government during the war, would now to a greater extent be supervised by the Ministry and its financial officers. Instead of there being a greatly increased control the railways would to a greater extent be conducted under their own management. It would be necessary, under the present abnormal conditions, that the State should take a very large part of control in the wages question and in rates and fares, and he hoped that the present negotiations on the question of wages would be over very soon. Machinery was also being provided which would take the settlement of railway wages and conditions of service during the period of control out of the direct hands of the Minister.

Sir Eric Geddes then discussed several other important issues of the day, and his speech has undoubtedly rendered special service in that it clears up many matters concerning which there is a considerable degree of misunderstanding.

Economic railway rates are expected to be introduced on or before January 15, and that will remove many of the anomalies which have prevented the proper distribution as between railway and coastal steamer and road motor traffic, and have contributed in no small degree to traffic congestion. He also pointed out that during the war short

Digitized by Google

traffic predominated, whereas shipbuilding and other special traffic calls for bolster and like wagons, although war replacements applied largely to ordinary wagons. Abnormal conditions in trade had seriously modified the flow of traffic and had also materially changed the relative volumes. In 1914 61 per cent. of Welsh coal went for shipment, average lead 23 miles. In 1919 60·5 per cent. went inland, average lead 200 miles. As a general average the lead is now up about 33 per cent., largely due to the diminution in coastal trade. In general traffic, too, traders were ordering and consigning in smaller quantities. On one railway tonnage was down 62,000 tons in one month, or 2 per cent.; but the number of separate consignments, and this means light loading of wagons, was up by 550,000 or 24 per cent.

In regard to general congestion, Sir Eric Geddes pointed out that difficulties at docks are not yet solved; lighters and barges are too widely used for storage, and at many ports improvement is slow. He anticipated that as soon as the revised demurrage rates are imposed the demurrage situation will improve. It was better to obtain full use of existing wagons than to buy large numbers of new wagons. On the subject of road motor transport the Minister of Transport indicated that motor road lorries are being usefully employed to relieve congestion, but they would not clear the present block by road traffic; they wanted to get the railways in good order. As soon as the railway position is on an economic level cartage would improve. Undoubtedly trade conditions were hampered by dislocation of the transport system of the country, but it was not entirely due to the railways. Instead, he thought we owed them a great debt of gratitude, and he did not think that it would be many months before improvement could be seen, especially if they obtained the help of the traders.

The Wagon Question.

WITH a total of about 700,000 railway wagons, including between 15,000 and 18,000 belonging to British railways and still in France, and about the same number waiting repair in excess of the normal, there are roughly 35,000 wagons out of traffic. Of those in France, from 600 to 900 are coming back per week, but these wagons need repair, and that is the "bottle neck." The yearly output of the railway shops was 25,000 new wagons; but during the first half of 1919 only 10,000 were turned out, by no means an unsatisfactory output in view of the circumstances which obtained and the policy of concentrating more particularly upon repairs. Since June, orders have been given for 22,000 more wagons, including 5,400 from outside firms; and orders for a further 5,100 are to be placed with private builders. A great difficulty is the enormous prices asked, although the contractors were safeguarded, and there was no prospect of holding them to a date for delivery.

Comparative Costs of Railway Wagons.

SOME prices were then quoted: 12-ton ordinary wagon—from £350 to £400, that is, from £100 to £150 over the present railway shop cost of building; even Woolwich Arsenal was able to build at £297. Sixteen-ton mineral wagon—quoted £278, railway shops, £200; 10-ton wagons—£270 against £180; 20-ton steel wagons—£359 against £270; 20-ton brake van—£965 against £680, and a pre-war cost of £270. Covered goods wagon—£302 against £255, £415 against £335. A 12-ton goods wagon at Woolwich Arsenal cost £297; railway shops, £225; outside cost, £360 to £395; pre-war cost, £90. A railway fish wagon cost £1,090, as compared with the railway shops' cost of £353.

Sir Eric Geddes did not believe that when all wagons are back from France, arrears of repairs overtaken, and an improved and more unified system of working in force, the railways would be in such desperate straits as to be obliged to pay so great prices for wagons; but in such case it would be the State which would have to pay. He did not wish, however, to appear to be accusing the private builders of being unpatriotic, "but their trade was getting on very nicely." For the eleven months of this year the value of exported wagon parts was £2,000,000; that was good business and it improved the exchange and was bringing money into the country. The Government did not want to stop that, but he believed the quickest way to improve matters at home would be to concentrate upon repairs. The railway shops could repair 1,000,000 wagons per year, but during the first half of 1919 they had repaired in excess of this, and in September were repairing 26,000 or 27,000 per week.

State Wagon Building.

THE Minister of Transport made out a strong case for building wagons in State workshops. The Government would be criminally negligent if they did not provide for wagons for 18 months or two years ahead. He thought that shortly they would be in a position to undertake that work and he was sure they could do it at more favourable prices, and they would avoid interfering with the wagon builders in their legitimate business.

In regard to locomotives he mentioned that 300 built for abroad have been lent on hire

Digitized by Google

to the railway companies; and there are no other British locomotives now in France. There was still a reserve of 30 or 40 heavy engines, and the locomotive position as a whole was all right, except that repairs are seriously in arrears.

Some of Sir Eric Geddes' remarks above referred to have caused a degree of heart-burning in certain quarters, and it is well to recognise that neither the railway workshops nor Government establishments are in quite the same position as the private wagon or locomotive-building firm. There are, in fact, several aspects which materially modify the situation suggested by prices and costs above quoted, and which render the case for private wagon-building firms more favourable; though the Minister of Transport may be entirely in the right in that both he and the railway companies are concerned with manufacturing and purchase costs, and not with the business affairs of firms engaged in the industry.

Railway workshops are concerned with both new construction and repairs, while only their own standards are involved. A private firm operates largely according to specifications which may vary widely with each order. Organisation is mainly on the basis of new construction. These and other factors materially affect the respective situations, but the fact remains that high purchase cost is a serious matter.

The Railway Advisory Committee.

As already intimated the Railway Executive Committee, having served its war functions, is now succeeded by a Railway Advisory Committee, operating in conjunction with the Ministry of Transport during the continuance of Government control of railways, but including representatives of the railwaymen's unions, in addition to general managers of a number of leading systems. The constitution includes virtually the existing personnel as regards the representative general managers: Mr. C. Aldington, C.B.E., General Manager, Great Western Railway; Sir A. Kaye Butterworth, North Eastern Railway; Mr. C. H. Dent, Great Northern Railway; Sir Francis Dent, South Eastern and Chatham Railway; Sir Sam Fay, Great Central Railway; Sir W. Forbes, London, Brighton and South Coast Railway; Mr. D. A. Matheson, Caledonian Railway; Mr. F. Tatlow, Midland Railway; Sir Henry Thornton, K.B.E., Great Eastern Railway; Sir Herbert Walker, K.C.B., London and South Western Railway; Major A. Watson, Lancashire and Yorkshire Railway; and Sir Thomas Williams, London and North Western Railway. In addition, however, four representatives of the railwaymen's unions become members: Mr. J. Bromley, Secretary, Amalgamated Society of Locomotive Enginemen and Firemen; Mr. C. T. Cramp, President, National Union of Railwaymen; Right Hon. Mr. J. H. Thomas, M.P., General Secretary, National Union of Railwaymen; and Mr. A. G. Walkden, General Secretary, Railway Clerks' Association.

It is also proposed to set up a board comprising equal representation of managers and railway trade unionists to deal with matters affecting wages and conditions of service.

Speaking in the House of Commons on Monday, December 8, Sir Eric Geddes, Minister of Transport, outlined the scheme in the following terms:—

"An arrangement has been come to between the Government and the railwaymen's unions that, apart from the present negotiations, questions of wages and conditions of service shall, during the period of the present control under the Ministry of Transport Act, be dealt with by a Central Board, consisting of five railway managers and five representatives of the trade unions—three from the N.U.R. and two from the Enginedrivers' and Firemen's Society—with power on each side to set up a sixth member.

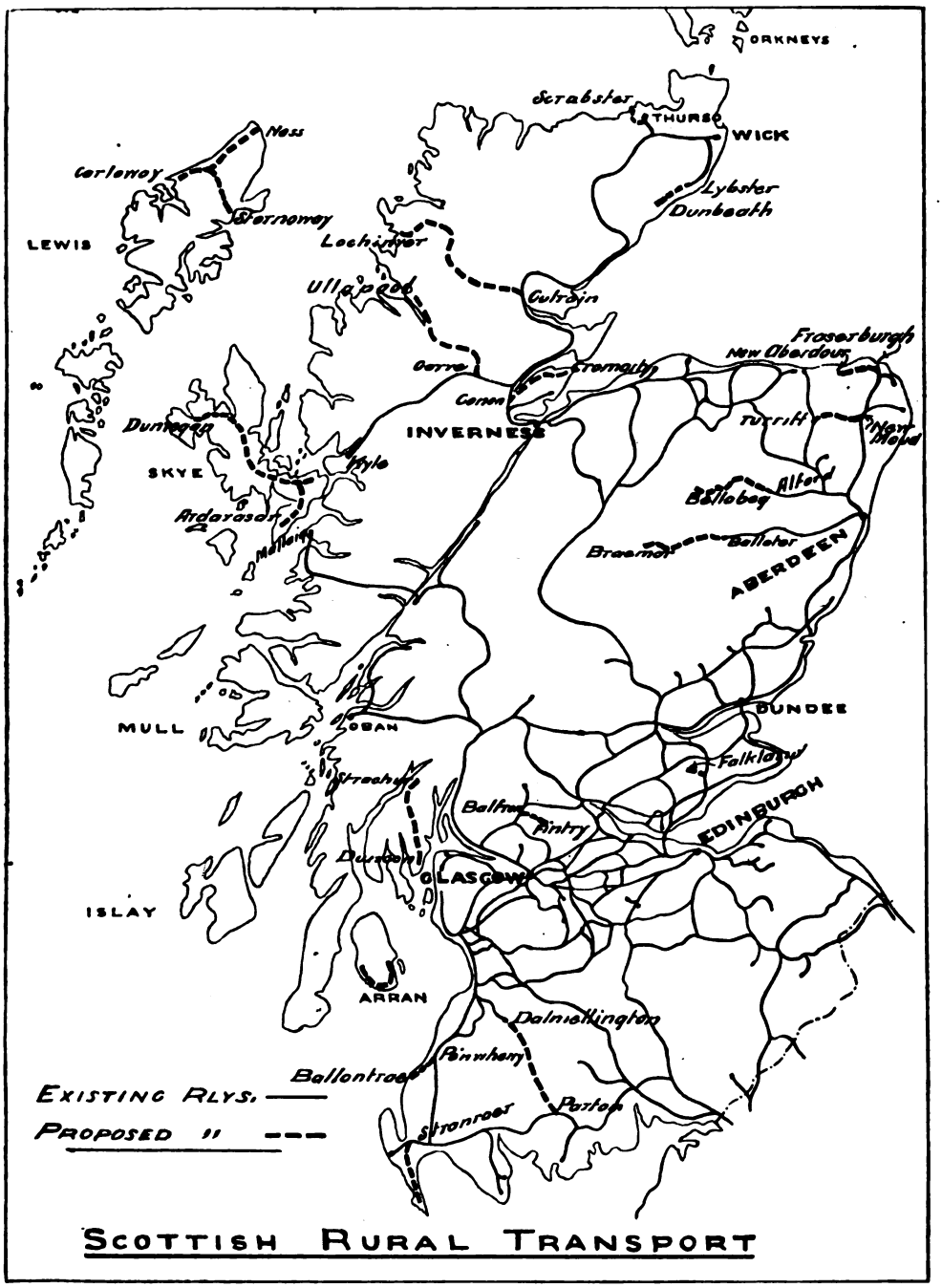
"Failing agreement by the Central Board, matters in dispute relating to wages and conditions of service will be referred to a National Wages Board, consisting of four railway managers, four railway workers or their representatives, and four users of railways—of whom one shall be nominated by the Parliamentary Committee of the Trade Union Congress, one by the Co-operative Unions, one by the Federation of British Industries after consultation with other industrial organisations, and one by the Associated Chambers of Commerce—with an independent chairman appointed by the Government.

"It has been agreed by the unions that no strike shall take place on account of disputes arising on matters of wages and conditions until one month after the question in dispute has been referred to the National Wages Board. Local committees will be set up to deal with local matters."

Transport Developments in Scotland.

A COMMITTEE was appointed by the Secretary of State for Scotland in February, 1918, "to consider and report upon the rural areas in Scotland which are most in need of transport facilities for the promotion of agriculture, forestry and other rural industries, and the means of improving communication in these areas, with special reference to new or improved roads, light and narrow gauge railways, and motor transport, including any consequential modification of existing steamer services."

Digitized by Google



PROPOSED STANDARD AND LIGHT RAILWAYS IN SCOTLAND.

As set forth by the Committee appointed to enquire into the question of rural transport in Scotland.

Digitized by Google

The investigation was a prolonged one, and the resulting recommendations advocate the construction of no less than 382 miles of new railway, 85 miles of new road, a large mileage of road improvements, and the institution of road motor services and steamer services covering routes many hundred miles in length. On the assumption that a Ministry of Ways and Communications was to be established, the Committee advocated the administration of these improved transport services—in fact, all Scottish transport services—by a separate department charged with the control of ways and communications in the country. They maintain that the conditions are greatly dissimilar to those in England, and that there would be a gain in efficiency if a distinct body were to deal with the control of Scotch communications.

Many of the proposals possess considerable individual interest, but cannot now be discussed. The accompanying map shows all proposed lines, as set forth in the following tables of suggested standard and narrow gauge lines :—

Standard gauge—	Length. Miles.
Culrain and Lochinver ..	40
Garve and Ullapool	33
Parton and Dalmellington ..	28
Turriff and Maud	21½
Alford and Bellabeg	19
Conon and Cromarty	18
Ballater and Braemar ..	17
Stranraer and Drummore ..	14½
Fraserburgh and Aberdour ..	9
Lybster and Dunbeath ..	8
Pinwherry and Ballantrae ..	8
Balfron and Fintry	8
Thurso and Scrabster.. ..	2
Total	226

Narrow gauge—	Length. Miles.
On the island of Skye ..	75
On the island of Lewis ..	40
Dunoon and Strachur ..	21
On the island of Arran ..	20
Total	156

Total length of recommended lines, 382 miles.

Remaining recommendations advocate new roads, 85 miles in length; road improvements on 225 miles of existing road; road motor services on routes 224 miles long; and new steamer and motor boat services on routes aggregating something like 1,000 miles.

Accounting of Railway Goods Traffic.

ADOPTING the view that the forwarding of all goods traffic "carriage paid" would avoid the necessity for abstracting, simplify accounting and produce great economies on the clerical side, Mr. L. C. Webber Reed, who has on several occasions expressed his ideas on this and kindred subjects in these pages, sends a leaflet outlining his proposals. He considers that the consignment note should be the document of paramount importance—the contract and basis of accounting and of all negotiations. One prescribed form, on substantial paper, with conditions stated on the back, should be adopted, if possible, for all kinds of traffic, except explosives and dangerous goods, for which special forms are necessary. Consignors with credit accounts would be required, as a condition, to prepare and render their consignment notes in carbon duplicate. The consignment notes to be tendered with the traffic, checked on behalf of the railway company, and immediately passed into the office to be charged and recorded in a consignment note register book (number of note, station to, name of sender and total charges only). The consignment note then to be passed on to the invoicer to be transcribed as at present on to a "way-bill" *but without charges.*

"Way-bills" should then be sorted in alphabetical station groups, or station truck order, as may be found expedient, to be ready for immediate use by shed or yard checkers. Three spaces to be provided at the foot of the "way-bill" for use of the checker at forwarding, transhipping and receiving stations, divided into columns for date, wagon number and checker's initials. The yard traffic (full loads) to be entered in a checker's register book from which the "way-bills" as well as the wagon register book would be systematically checked, a very desirable tightening arrangement.

It will be seen that by reason of the consignments for one station being focussed in one document (the "way-bill") the checker's duties will be greatly simplified and accelerated. The forwarding of *goods unentered* would automatically cease, as the checking will be from the "way-bill." The "way-bills" being prepared under much more favourable conditions should be accurate and always ready to accompany the goods.

In the office the consignment note would form the basis for accounting. Total charges (local and foreign in separate columns) would be entered in the consignment note register book to create the debit allocated to the respective columns—cash, ledger, transfer, agent, &c.—totalled daily, and balanced. A monthly summary of the daily totals could then easily be prepared, each column being balanced with the respective registers. The gross total of the created debit for the month thus balanced would manifestly represent the accurate monthly revenue.

The trader's debits would be prepared direct from the consignment notes, with the aid of the consignment note register, the carbon copy of the trader's note being

Digitized by Google

detached, checked, certified as correct, and despatched to the trader by office messenger. All that would then be necessary is a simple transcription of the sender's number on the note and the total charges thereon, the duplicate copy being restored so that the trader's check would be merely a matter of comparing and confirming the entry on the account.

Two Sides to every Question.

ADMITTING that Mr. Webber Reed's proposals offer many possibilities, it is well to consider alternative aspects. A railway accounting officer comments that the general adoption of a " carriage paid " system would undoubtedly possess certain advantages, but takes exception to the statement that economies in " allocation " would ensue, and that " immense " savings in accounting and relief of the wagon shortage would be accomplished.

It does not at all follow, even granted the possibility of enforcing an " everything paid " system, that the abolition of revenue abstracting would be a business proposition. It is well to remember that the gross goods train receipts on British railways represent upwards of £100,000,000 per annum; it cannot seriously be suggested that the proper accounting of this vast sum of money should rest on the book-keeping of the forwarding stations only without audit office supervision. The reference to huge expenses of audit office activities is not supported by figures, and it is doubtful whether the auditing expenses incurred in connection with British railway goods traffic revenue as a whole exceed, or even equal, one-fifth of 1 per cent. thereof, or £200,000 per annum. Whilst " simplicity and economy " would arise from the abolition of abstracting, one cannot agree that " efficiency " in accounting for an enormous revenue would be attained by such a drastic measure.

To say that the consignment note should be of paramount importance is to state a truism, as that document forms the basis of all negotiations to-day, whilst the suggested use of a " way-bill " seems to be simply a alternative to the invoice, with the exception that no charges would appear on the former. This means that receiving stations would have no concern in the charges arising on traffic from other centres, although to-day it is an important principle that the receiving stations shall check the invoiced charges, a system whereby considerable undercharges are brought to light and debited.

It is observed that, in Mr. Webber Reed's scheme, provision is made for the consignment notes to be entered in a register book, and in addition the " way bills " are to be recorded for tracing purposes and to permit of the compilation of statistical information. " This double registry would create as much work as is involved in the preparation of abstracts, which latter documents form the present-day basis of debit and of statistical and tracing matter. Further, the proposed ' way bill ' registers are only to show the pro-numbers and total weights; of what use would that record be for ascertaining tonnages of particular classes of traffic forwarded? Again, if inward accounting ceased, undercharges would not be discovered, and this might seriously jeopardise the companies' revenue, as it would be a simple matter for consignment notes to miss the operation of being passed through the register."

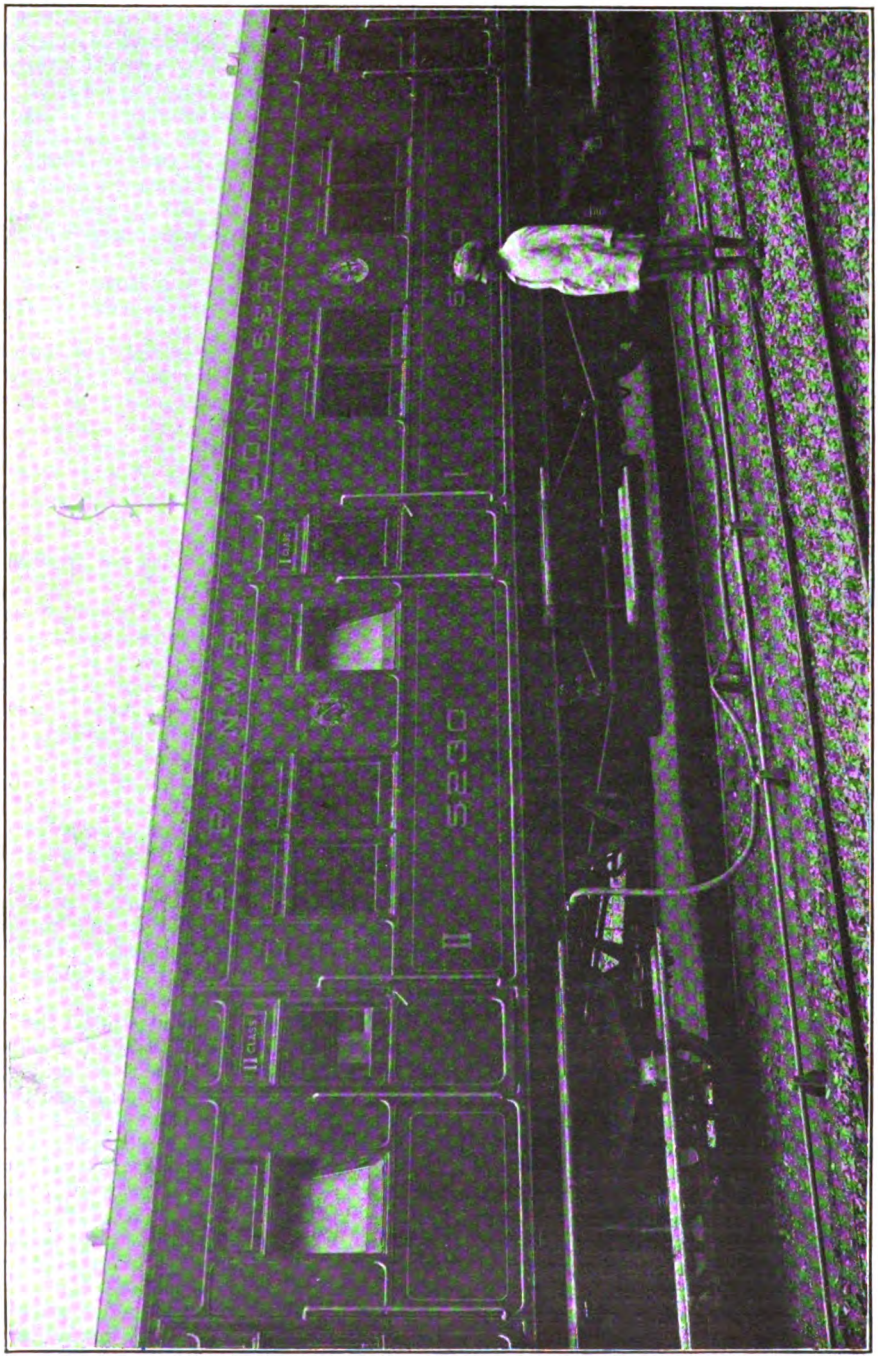
Other aspects are discussed, but we need not press the matter further. The probable solution is a suitable mean between existing and proposed methods, and if a practicable compromise is realised the railway world will still be indebted to Mr. Webber Reed for this propaganda in the direction of improvement.

Filling Lavatory Carriages on Indian Railways.

Since lavatories are now provided in all carriages, irrespective of class, on main line trains of the Indian railways, the problem of providing water in sufficient quantity and quickly has had to be faced. On some railways, notably the East Indian, very elaborate installations of overhead pipes were arranged some years ago, but on other lines of more recent development the only provision has been ordinary tank barrows having hand pumps by which the carriage tanks can be filled through hose pipes. This method is slow and very expensive in labour (four men to each) and material, due to the heavy wear and tear of hose pipes, &c.; further, it is very inconvenient on a crowded Indian platform.

When the matter came under the consideration of the Great Indian Peninsula Railway Administration it was decided, on the recommendation of the Carriage Superintendent (Mr. A. Morton Bell), to adopt " low level " filling arrangements, that is to say, have water mains laid alongside the tracks at water stations, with hydrants placed at convenient points, with connections for hose pipes to be readily attached, these, in turn, being coupled up direct to connections provided on the cars below floor level. This arrangement obviates the necessity for elaborate and costly staging for the water pipes, also the objectionable practice of men walking along the roof of the cars, whilst it enables all the lavatory tanks in a train to be filled by men standing at track level. Needless to say there is a very

Digitized by Google



GREAT INDIAN PENINSULA RAILWAY: FILLING LAVATORY TANKS BY THE "LOW LEVEL" PROCESS.

Digitized by Google

considerable saving in labour, as one man can attach two or three hose pipes, and a few men can give the required water to *all* the cars in a long train all but *simultaneously*, a very important consideration where heavy troop and tourist trains running in a tropical climate are concerned.

All the modern cars of the G.I.P Railway have connections provided for this service, and in the case of restaurant cars these have both high and low level tanks, water being pumped from the latter by the kitchen staff as required *en route*. Foreign stock operating over the G.I.P. unfitted with the "low level" connections is filled by the hose pipes being carried to the roofs, and, in like manner, all the G.I.P. coaches have the usual filling holes along the roofs to enable the tanks being filled on railways having the "high level" arrangements or tank barrows. The hose pipes are in convenient sections, and are usually protected by wooden balls clamped on at intervals of about 3 ft.

Railway Bills in Parliament.

ELEVEN railway Bills are being promoted for the coming Parliamentary Session, six relating to existing English railway companies, four are promotions by new companies seeking incorporation for the construction of railways and works, and the remaining Bill, promoted by the "Underground" companies, relates to an alteration in statutory fares. The Central London and Metropolitan District Railways Bill relates to the construction of three short lines connecting the Central London Railway near Shepherd's Bush with the Kensington and Richmond branch of the London & South-Western Railway, to running powers thereover, and to arrangements for electrical equipment; also to the enlargement of Aldgate East Station. The Derwent Valley, Calver & Bakewell Railway is promoted to construct a railway in the Peak district between Grindleford on the Dore & Chinley line and Hessop, on the Midland Company's Manchester line, together with loops at each end, arrangements with the Midland Railway for working being also covered. The Galway (Barna) Railways & Harbour Bill is a new project on somewhat similar lines to those previously brought forward for a deep-water harbour on the west coast of Ireland. The Great Eastern Railway Bill includes powers for the purchase of land at East Bergholt and of the Felix Hotel at Felixstowe.

A new railway from Waltham to Colsterworth, connecting the existing branch from Great Ponton with the Melton Mowbray line, is promoted by the Great Northern Railway. In addition widenings are to be authorised at five places on the main line: Barrowby Road (Grantham) to Peascliffe; Balderton to Claypole; at Newark; Cromwell to Crow Park and Ranskill to Sutton; on the Nottingham-Grantham line between Gonerby and Barrowby Road and Bottesford to Belvoir Junction; and at Blankney on the Great Northern and Great Eastern Joint line. It is also proposed to abolish certain level crossings and to make new roads and footpaths. Powers in regard to the Sutton Dock Company are also covered.

Lever Bros., Ltd., apply for powers for wharf and railway construction on the Mersey to serve their premises. The London Electric, Metropolitan District, City & South London and Central London Railways' Bill makes provision for increase or alteration in fares, tolls, rates and charges, and to amend certain existing Acts. The Mersey Railway Bill is of a financial nature, while the Mullingar and Kells Railway Bill is for the construction of a railway from the Midland Great Western of Ireland at Mullingar to the Great Northern Railway of Ireland at Kells, together with provisions for running powers and other arrangements. Remaining Bills relate, one to the abandonment of the authorised Penllwyn Railway, and the other to a revival of the Thames Ocean Wharf and Railway scheme.

Digitized by Google

MR. PERCY HOWARD PRICE is the new Secretary to the British Railway Clearing House in succession to the late Mr. H. Cuff Smart. Mr. Price, who is well known in the railway world, has been Secretary of the Birmingham, South Staffordshire and East Worcestershire, Normanton and West Riding Conferences for many years. He entered the service of the Clearing House in 1889, and was appointed head of the secretarial department in 1916 (where he has spent the greater part of his service), and upon the death of Mr. Cuff Smart, in October, 1919, he was appointed acting secretary.

* * *

A LARGE gathering, representative of all grades of the railway service, recently assembled in the board room of the Belfast & County Down Railway to make a presentation to Mr. P. A. Arnott on the occasion of his appointment as engineer of the company. The gifts consisted of a handsome solid silver salver with suitable inscription accompanied by a barograph. Mr. C. A. Moore the General Manager, occupied the chair, and after making sympathetic and touching reference to the death of the late engineer, Mr. G. P. Culverwell, said Mr. Arnott had come amongst them 13 years ago as a complete stranger, and in the capacity of assistant engineer had proved himself to be possessed in a high degree of those qualifications which make for success. Mr. W. F. Minnis, Traffic Superintendent, to whom was entrusted the pleasant duty of formally asking Mr. Arnott's acceptance of the gifts on behalf of the subscribers, in the course of a happy speech, outlined Mr. Arnott's career with the Belfast and County Down Railway, and associated himself with the staff in congratulating him on his well-earned promotion.

MR. PERCY HOWARD PRICE,

Secretary, Railway Clearing House.

* * *

MR. ROBERT WILLIAMS, who has been appointed Leading Draughtsman in the Locomotive Department of the Midland Great Western Railway of Ireland, is the elder son of Mr. Joseph Williams, Accountant of the Maryport and Carlisle Railway, and commenced his railway career in the Locomotive Department of that company. Having a keen desire for a thorough training in railway mechanical engineering he, on the completion of his apprenticeship, proceeded to Glasgow and obtained a post as improver, and afterwards journeyman draughtsman, at the North British Locomotive Company's Hyde Park Works. Whilst serving there he took courses in the evening classes at the Glasgow and West of Scotland Technical College under Professors Rowden and McLean in mechanics, electrical engineering, &c. Afterwards, to gain a wider experience in railway work, he served for a while in the locomotive drawing office of the North Staffordshire Railway, and from there transferred to the Carriage and Wagon Department of the North

Digitized by Google

Eastern Railway, his present employers, where, in addition to ordinary drawing office routine, his duties included inspection of wagons and laying out and arrangement of new workshops. During the war he served as Armament Artificer Staff-Sergeant. He was severely wounded in France, but fortunately made a good recovery.

* * *

"IN memory of the employees connected with the Glasgow and South Western Railway Company who died in the service of their country during the war, 1914–1919," a neat booklet has been issued by the company, containing names of 299 employees who were killed, died from wounds, were drowned at sea, or died from other causes during the Great War. At the commencement of the war the Glasgow and South Western Railway Company employed 9,804 men, and up to November 11, 1918, 2,410 of these had joined His Majesty's forces.

* * *

MUCH interest attaches to the recent announcement that Mr. A. L. McColl has been appointed a director of the Vacuum Oil Company, Limited, a position in which his well-known personality and ability for organisation should find ample scope. He was for many years employed in the Locomotive Department of the Glasgow and South Western Railway, and has a large circle of influential friends in the railway and engineering world to whom his new appointment will be a matter for congratulation.

* * *

RECENTLY, in the Board Room of the Irish Railway Clearing House, 5, Kildare Street, Dublin, Mr. Joseph Ingram, who has resigned the secretaryship of that establishment to take up an important position in the Ministry of Transport (Ireland), was presented by his friends on the staff with a valuable gold watch suitably inscribed, also a piece of plate for Mrs. Ingram, as a token of esteem and goodwill. Mr. P. J. Brennan, who has succeeded Mr. Ingram as secretary, occupied the chair. In an appropriate speech the chairman referred to the rapid and well-earned promotion which Mr. Ingram had attained, and said that his friends could not let him sever his connection with the House without giving some expression of their appreciation of his efforts during the trying years in which he occupied the position of secretary. They met to congratulate him and to convey their best wishes for success in his new position, therefore, on behalf of those assembled he asked Mr. Ingram's acceptance of the presentation. Messrs. Gosson, Conmey and Butler having spoken in eulogistic terms, Mr. Brennan then made the presentation, which Mr. Ingram, on behalf of himself and wife, acknowledged in well-chosen words.

* * *

THE work of the 20th Light Railway Train Crews' Company (R.E.), while serving in France with the British Expeditionary Force from 1917 to 1919, has been commemorated by the issue of a permanent illustrated record, compiled by Mr. J. H. Laytham, of the Midland Railway Company's staff at Bath. Mr. Laytham was a sapper in the company, which consisted of three officers and 252 men, drawn from various branches of the British railway service. The 20th Company was mobilised at Bordon Camp, Hants, and left for France on March 18, 1917. In conjunction with the 3rd and 30th Companies it conveyed material required for the battle of Vimy Ridge on April 9, 1917. The record is illustrated with portraits and photographs of rolling-stock.

* * *

"LONDON, BRIGHTON AND SOUTH COAST RAILWAY 0-6 0, "E" class, tank engine No. 418, illustrated on page 418 of the December, 1919, RAILWAY MAGAZINE," writes Mr. O. J. Morris, "was designed by Mr. Stroudley and built at Brighton in December, 1874, when it was named *Bordeaux*. Dimensions were: cylinders, 17 in. by 24 in.; wheel-base, 18 ft. 2¾ in.; wheels, 4 ft. 6 in. diam.; heating surface, 1,006 sq. ft.; weight in working order, 30½ tons. No. 111, formerly *Montpelier*, built in March, 1877, to the same design, is employed as yard pilot at New Cross."

* * *

ON page 442, RAILWAY MAGAZINE, December, 1919, appeared an illustrated account of a scale model of London and North Western Railway express locomotive, No. 2222, *Sir Gilbert Claughton*, which is being built and sold at sixteen guineas by Bassett-Lowke, Limited, the famous model engineers of Northampton and London. The price in the paragraph was given in figures, and by an unfortunate typographical mishap the 1 in front of the first 6 was dropped, so that the figure quoted became six pounds sixteen shillings instead of the correct sum. RAILWAY MAGAZINE readers, as a rule, are too sophisticated to be misled by such accidents, but if any were we must express our regret. Doubtless the firm would be very glad if they could produce and sell such a magnificent model for the small price that appeared in the printed page, but as a matter of fact sixteen guineas is a very low figure for a model of such excellence and quality in these days of stiff gradients in price lists.

Digitized by Google

By courtesy] [*W. Tolley.*

OLD NORTH DEVON RAILWAY LOCOMOTIVE AT BIDEFORD.

From an old photograph.

OUR Crewe correspondent, Mr. C. Williams, writes :—London and North Western Railway, No. 1387, *Lang Meg*, is the latest "Precursor" class locomotive to be superheated. It retains the original 19-in. cylinders with slide valves and external appearance. Nos. 1938, *Sultan*, and 1963, *Boadicea*, four-cylinder compounds, have been converted to "Renown" class (two-cylinder simple). A further two compound mineral engines, Nos. 1882 and 2568 have been simplified and superheated, the former with piston valves and the latter with slide valves. The London and North Western Railway sent a total of 111 engines overseas, of which 85 were 0–6–0 and 26 0–8–0. Of these 69 have so far returned, including all the 0–8–0.

* * *

In regard to the paragraph (reply to Mr. D'Arcy Edmondson) in December RAILWAY MAGAZINE, page 421, anent the D.X. type engines, London and North Western Railway, may I point out that all the D.X.'s now running are vacuum brake fitted ? The last of the non-vacuum D.X.'s disappeared in 1902, and up to date no fewer than 384 of the vacuum class have been scrapped or sold, thus leaving 116 of these engines still at work.

* * *

A "HALT" named "South Queensferry Halt," between Dalmeny South Junction and Port Edgar, North British Railway, was opened for passenger traffic on December 1, 1919.

* * *

A SURE sign of a return to pre-war conditions is the aspect of almost any London Underground station to-day. Apart from the painting of many of the stations there is a noticeable improvement in the cleanliness and display of posters upon the stations, the return of staff from the war and the lessening of paper restrictions, making it now possible for the hoardings and platforms to be kept tidy and bills renewed with something like their pre-war regularity. In addition the lighting of stations and illuminated signs on the railways is beginning to give the stations a homely look reminiscent of 1914. Cleanliness and efficiency go hand in hand, and for this reason alone the Underground Company is paying attention to this aspect of reconstruction.

* * *

AT the December general meeting of the members of the Railway Club, 92, Victoria Street, S.W., there was presented an exceedingly able lecture by Mr. J. J. Elmer, formerly works' manager to the Westinghouse Brake Company, Limited. Mr. Elmer, whose remarks were illustrated by lantern slides, took for his subject "The Story of the Westinghouse Brake." His audience followed with close attention his description of the working of this remarkable piece of mechanism, and note was made of the enormous vogue of the brake throughout Europe and other parts of the world. At the conclusion Mr. W. Parker cordially thanked the lecturer, and several members asked questions or expressed opinions. In regard to the latter, the general trend was decidedly on the side of the Westinghouse brake and the hope was expressed that if, under the Ministry of Transport, standardisation is effected, the decision will be in accordance with that feeling. Mr. Thorpe, who was present, representing the Westinghouse Brake Company,

Digitized by Google

Limited, kindly invited the members to visit the company's York Road works.

* * *

NEASDEN, as a manufacturing centre, possesses so many advantages that it is scarcely surprising the Metropolitan Railway should, as it were, seize upon and boom the district for all it is worth. The accompanying illustration of a somewhat striking poster shows very clearly not only the nearness—six miles—of Neasden to the Metropolis,

METROPOLITAN RAILWAY NEW POSTER.

but also how directly it is in touch with the various railway systems throughout the kingdom, thus justifying to the full the claims of the railway company that it is "the ideal centre for large works and factories." The facilities generally are excellent, the rates low, whilst the healthiness of the district is unquestioned. Firms desiring superior factory sites of from 15 to 20 acres should apply for particulars to Mr. H. Gibson, the Metropolitan Railway Country Estates, Limited, Baker Street Station, N.W.1.

Messrs. Joseph Kaye & Sons, Ltd., of Leeds and London—the original inventors and makers of their seamless serrated oil-feeders and seamless spouts—have been the sole contractors, without a break, to the British Navy in this particular for the last 16 years and during the period of the War, from 1914 to 1919, they supplied 233,545. Messrs. Kaye are naturally proud of this achievement, in addition to which they have recently received a further complement or order for 13,152 from the Admiralty for these oilcans making a grand total of 246,697 from the beginning of the War.

* * *

WHEN a Great Eastern Railway train was leaving Haverhill at half-past one on a recent morning for Cambridge during a snowstorm it was derailed and two first-class carriages were telescoped. Mr. Jarvis, a retired builder, of Clare, Suffolk, was killed, but the other passengers escaped with slight injuries. A daughter of Mr. Jarvis, who was in the same compartment with him, was only extricated by smashing the woodwork. She had received a severe shaking. The buffers of a siding were carried a distance of 20 yards by the train.

* * *

POWERS are sought, under a private Bill promoted by the Central London Railway and the Metropolitan District Railway to link up the Central London "Tube" with the railway to Richmond. A short stretch of the "Tube" extension would be carried from a point underneath Uxbridge Road to the Shepherd's Bush Station of the Metropolitan line. It is proposed in the same connection to electrify the line from Shepherd's Bush to Richmond under a separate Bill, the combined underground electric companies ask for legislativs authority to "increase or alter" fares and rates.

* * *

PILFERING of goods in transit between Irish ports and British centres has become so widespread that the Mayor of Londonderry, who is also President of the Londonderry Chamber of Commerce, has demanded, at a meeting of the chamber, that it should receive the urgent attention of shipping and railway companies. "My own experience," he said, "proves that organised bodies of thieves have reduced pilfering to a scientific system, under which goods are so skilfully extracted from packages and packages again so carefully fixed that the theft cannot be detected until the packages are opened after delivery. All attempts to defeat the thieves by varying packing and changing cords, seals, or routes are unavailing."

Digitized by Google

MR. T. WARD GREEN recently presided in Shrewsbury at a series of conferences with the promoters of various light railway schemes in the county. One scheme is for a railway to link Bishop's Castle, which is the terminus of the Craven Arms-Bishop's Castle Railway, with the Cambrian Railways somewhere in the vicinity of Montgomery but going *via* Chirbury. The distance is 12 miles, and the route presents no engineering difficulties. Other schemes include a railway from the Joint Railways at Craven Arms by way of Corvedale, 20 miles to Bridgnorth, and thence 15 miles to Wolverhampton, and a railway from Craven Arms to Newcastle, in the Clun Forest Area, a distance of 12 miles.

* * *

MANY RAILWAY MAGAZINE readers are owners of model locomotives, and those who have repairs waiting to be put in hand will be pleased to know that this kind of work is undertaken by Vernon Smith & Sons, Limited, of 117, 121, 123, High Road, Chiswick, W.4. In addition, the firm have the largest and most varied stock of second-hand model locomotives, &c., in London.

* * *

OWING to the number of inquiries received lately for films of an educational and Imperial nature Sir George McLaren Brown, European General Manager, Canadian Pacific Railway, arranged for a display of new Canadian films to be given at the Central Hall, Westminster, on December 12 and 13. Afternoon and evening exhibitions were given of Canadian films not hitherto shown in this country, including such subjects as the "Woollen Industry—from Fleece to Finished Product," "Paper Industry—from Forest to Press and Bindery," "The Asbestos Industry," "Salmon Fishing on the Skeena River," "Lumbering and Fishing in New Brunswick," and "Fighting the Car Shortage," &c. At each performance a number of lantern slides were exhibited showing the triumphant tour of H.R.H. the Prince of Wales in Canada.

* * *

ONE by one the pre-war travel facilities are returning, and we shall be able within a few months to cast as little thought to a journey to the Continent as to one, say, from London to Manchester or Edinburgh. The London office of the Italian State Railways has made arrangements whereby through-registration of luggage from London to Modane (frontier station of the Mt. Cenis route) via Boulogne and Paris shall be introduced on and from December 1; this will avoid the delay at the Nord and Lyons stations in Paris in claiming and re-registering baggage and enable the connection between the two stations to be made by the Girdle railway, thus obviating the need of crossing Paris by road.

* * *

IT is announced in Rome that Italian railway rates will be increased 80 per cent. for first-class fares, 60 per cent. for second-class and 50 per cent. for third-class, in order to meet the increased cost of coal and labour.

* * *

WE are informed by the London office of the Italian State Railways that the chief normal gauge railways on the Island of Sardinia, which have hitherto been worked by a private company, will be absorbed in the system of the Italian State Railways on and from January 1, 1920. The services will be thoroughly reorganised, rolling-stock overhauled and various other improvements effected, and these arrangements will be advanced by the time the tourist traffic commences next spring.

* * *

IN spite of their very short official visit and their many engagements in the country, the Uruguayan Mission have nevertheless found time to visit Armstrong's Works at Newcastle-on-Tyne. Their visit took place on Wednesday, December 3. In view of future railway developments in Uruguay, and also the importance of Montevideo as a large port, they were particularly interested in the new locomotive works and the immense shipyards.

* * *

A GENERAL reduction is taking place in the number of women employed on railways in the United States. In the first six months of 1919 the total female staff fell from 99,709 to 82,294, a decrease of 17.4 per cent. The largest proportion, 74,744, was employed on clerical work, and there the reduction has been 13.6 per cent. Because of the heavy character of the duties instructions have been given that women are not to be employed in depôt parcel rooms as section labourers or as "truckers."

* * *

THERE is a great deal of dissatisfaction in France at the unpunctuality of trains and the uncertain time-tables. It is very unusual on any of the lines, for a train to arrive up to time, and an hour or an hour and half's delay is by no means rare. A disconcerting habit is also growing up of altering the scheduled stopping-places of the trains.

Digitized by Google

THE extent of the work to be done in repairing the damaged railway system in France is indicated by details published in *La Nature*. The Nord system alone sustained damage amounting to 2½ milliard francs, the works destroyed comprising 1,180 bridges—including 210 exceeding 10 metres in length—8 large viaducts, 5 tunnels and 228 railway stations. No fewer than 115 water supply depôts were destroyed, and in 350 stations the whole of the electrical material and tools were rendered useless. At the date of the armistice certain provisional repairs had been carried out, but there still remained 585 km. of double track, and 529 km. of single track to be reconstructed. By October all the lines, with the exception of about 111 km., were in working order, and 10 stations only remained unserved.

BY the Great Eastern Railway Musical Society the second concert of the season was given on December 3 in the Hamilton Hall of the Great Eastern Railway Hotel at Liverpool Street Station. The popularity of these concerts is so great that some minutes before the commencement the hall was full. An atmosphere of warm enthusiasm prevailed and everything went with verve.

* * *

MR. R. J. M. INGLIS, North British Railway District Engineer, Glasgow, has been given on loan to the Ministry of Transport, and, with a view to the carrying on of the work during his absence the directors have made the undernoted appointments, viz. :—Mr. J. G. MacGregor, District Engineer, Carlisle, to be Acting District Engineer, Glasgow. Mr. C. A. Falconer, Assistant, Head Office, to be Acting District Engineer, Carlisle.

LONDON AND SOUTH WESTERN RAILWAY.

Memorial at Waterloo Station, London, to the Company's servants who have fallen in the Great War.

Digitized by Google

Railway and Other Literature.

ELECTRIFICATION OF THE METROPOLITAN RAILWAY SYSTEM IN MELBOURNE. Edited by C. T. Stephenson. *Industrial Australian and Mining Standard*, 376, Flinders Lane, Melbourne. Price 5s.

Published by authority this represents the official description of the electrification of local lines in the Melbourne area. A large pictorial plate depicting Flinders Street station and yard is backed by a diagram showing the special overhead construction in Flinders Street yard. It covers no fewer than 42 tracks in one place. The station includes 14 platforms, but closely associated is the Spencer Street station, connected by four viaduct tracks, with 10 platforms, all of which, except two, are terminal. From Spencer Street through North Melbourne there are six running lines, while from Flinders Street past Joliment sub-station there are also six tracks. On the scale suggested by these general facts it will be realised that exceptional work is involved. A frontispiece is provided by a portrait group of chief officers responsible for the work in its various stages. Then follows an historic review, including some interesting pictures of early railway days in Melbourne. Newport Power Station is then described. This is at the mouth of the River Yarra. Current is supplied at 20,000 volts, three-phase, by 13 feeders to the traction sub-stations. For traction direct current at 1,500 volts is used, supplied through overhead conductors supported upon standards of various types. Trains are usually operated in six-car sets, though 8-car trains are contemplated; new vehicles and some adapted ones being of sliding door type, while others have been converted from swing door suburban stock. At present there are 359 motor coaches, 56 driving trailer coaches and 287 ordinary trailer vehicles. Sliding door coaches have transverse seats and central passage ways. Pantograph collectors are used. The electric system covers about 340 track miles made up of 3·15 miles 6-track, 5·36 miles 4-track, 2·23 miles 3-track, 110 miles 2-track, 33 miles single-track and 36 miles of sidings. In many instances the overhead conductors necessitate elaborate supporting structures. Signalling on these lines is largely three-position upper quadrant, automatic or power operated. In some places, as in shadow, light signals are used instead of semaphore. This volume constitutes a valuable record of a notable electrification undertaking, which we hope to describe in detail in due course.

ABSTRACTS OF PAPERS IN SCIENTIFIC TRANSACTIONS AND PERIODICALS.—Prepared and published by the Institution of Civil Engineers, these abstracts continue the useful series hitherto published in the Proceedings of the Institution, but which are now to be issued quarterly in independent pamphlet form. Subject and name indexes are included, and, as all branches of engineering activity are covered, a wide range of valuable information is rendered conveniently available. Combined with the Proceedings these abstracts were highly appreciated; published separately their scope of usefulness is increased.

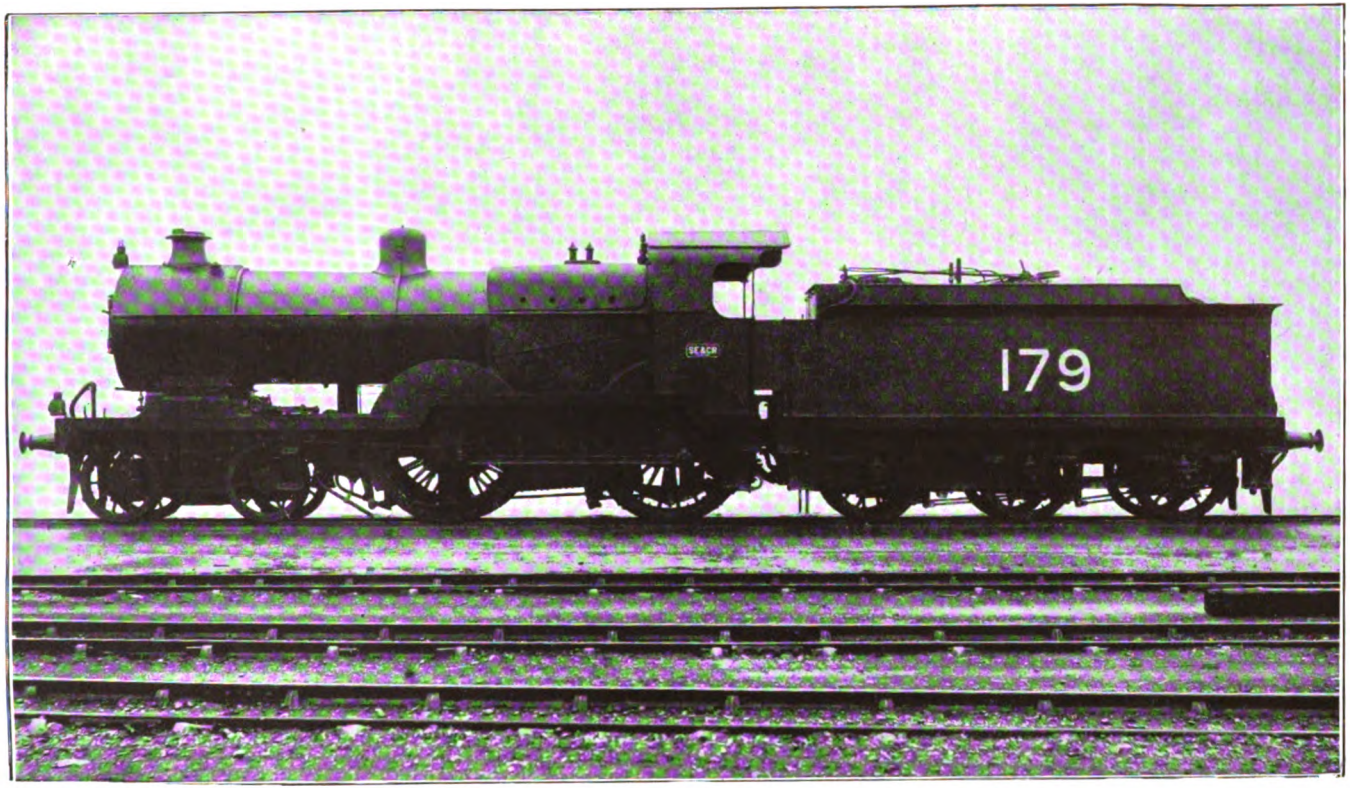
THE INDUSTRIAL COUNCIL FOR THE BUILDING INDUSTRY. Harrison and Sons. Price 1s. net.

Issued under the auspices of the Gorton Foundation this booklet describes the origin and formation of what is now known as the "Building Trades Parliament," to which both employers' and employees' trade organisations are parties. It is contended that this movement is proving of special benefit in matters affecting the building trades, and that similar procedure would be of value in other branches of industry.

THE ECONOMIC REVIEW.—Continuing the well-known *Review of the Foreign Press*, prepared by the War Office for military purposes, as a peace-time publication in private hands, *The Economic Review* will now be issued from Watergate House, Adelphi, London, W.C.2, at the price of 1s. weekly. The *Review* is being conducted as a public service on a self-supporting—though not a profit-making—basis. The staff have been chosen from among those who carried on the same work for the Government, and whose impartiality has never, so far, been called in question. No proprietor or capitalist has any control over its editorial impartiality which is guaranteed by an Advisory Council of well-known public men representing various interests and opinions.

Digitized by Google

Digitized by Google



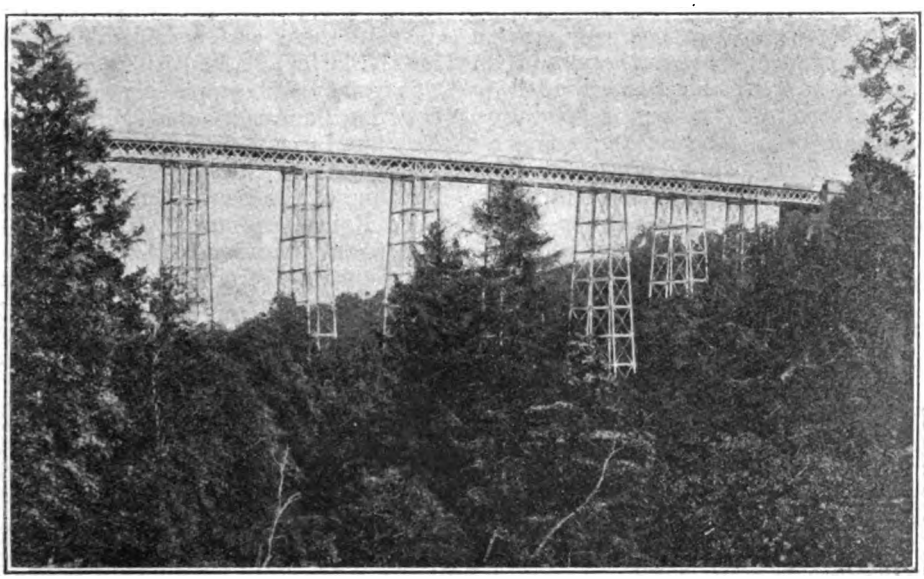
THE RAILWAY MAGAZINE.

REBUILT SUPERHEATER EXPRESS PASSENGER LOCOMOTIVE: SOUTH EASTERN AND CHATHAM RAILWAY.

MR. R. E. L. MAUNSELL, C.B.E., Chief Mechanical Engineer.

Cylinders: 19 in. × 26 in. Coupled Wheels: 6 ft. 6 in. diam. Steam Pressure: 180 lbs. per sq. in.
Heating Surface: Tubes (large) 322·25 sq. ft.; (small) 827·6 sq. ft.; Firebox: 127·13 sq. ft.; Superheater: 228 sq. ft. Grate area: 24 sq. ft.
Weight of engine in working order: 52 tons 10 cwt.; Engine and tender: 91 tons 10 cwt.

Digitized by Google



DEEPDALE VIADUCT, NORTH EASTERN RAILWAY.

On the North Eastern Railway:

FROM DARLINGTON TO TEBAY AND PENRITH. [No. I.]

By H. L. HOPWOOD.

ON account of its unique situation and its many fine viaducts and other engineering features, the Darlington-Tebay section of the North Eastern Railway has always appealed to the writer, but it was only lately that an opportunity occurred of spending some time in the district served by the line. Passing for the most part through a wild and romantic region—romantic from both scenic and literary standpoints—the railway crosses the Pennine Range, and there attains the second greatest altitude of any passenger line south of the river Tweed.

With the two branches from Barnard Castle to Bishop Auckland and to Middleton-in-Teesdale, and that from Kirkby Stephen to Penrith, the section described totals 99 miles, and was made by four originally independent companies, now merged into the North Eastern system. To this total may be added 12 miles, the length of two mineral lines which diverge between Darlington and Gainford. Both of these were built by independent companies, and one—the Forcett Railway—still retains its separate identity, though it is worked by the North Eastern Railway.

A proposal to connect the picturesque town of Barnard Castle with the trunk line at Darlington was first made at the time of the Railway Mania, when a company called the Barnard Castle and Darlington Junction Railway figured as one among the 1,118 schemes which were provisionally registered in 1845. But, like many such projects of that year, the company in question had only a brief existence, and it was not until 1854 that the Darlington & Barnard Castle Railway was formed. The opening of this railway —15 miles of single line extending from a junction with the Stockton & Darlington

Digitized by Google

Railway outside North Road station to a terminus at Barnard Castle—occurred on July 8, 1856. This company existed in an independent state for no more than two years, as it was absorbed in 1858 by the Stockton & Darlington Railway, which had been the working company from the first. Nor did the original passenger station at Barnard Castle remain in use for long, as it was superseded by the present building in 1861, when the South Durham & Lancashire Union Company extended the line from Barnard Castle to Tebay.

As a matter of fact, the South Durham & Lancashire Union Railway commenced at a junction with the Hagger Leases branch of the Stockton & Darlington Railway and extended to Tebay, *via* Barnard Castle and Kirkby Stephen. This railway was designed "to connect the ports of the North Sea with those of the Irish Sea and to unite the manufacturing districts of Durham, Northumberland and Cleveland with those of Lancashire and the West," as the original prospectus has it. At the time it was projected the Cleveland ironstone district was being rapidly developed. In the manufacture of iron from this Cleveland ironstone, it was found that the best results were obtained by mixing the richer Lancashire ore with it; consequently there was considerable demand for the latter ore, and a large amount of this traffic had been passing for some time between Lancashire and Middlesbrough, &c., but by a very circuitous route, *i.e.*, via the Newcastle & Carlisle Railway. The line of the South Durham & Lancashire Railway promised to give a more direct route between the two districts and the Company received its Act of Incorporation in 1857. There was every prospect of an abundant traffic, as Lancashire ore would be brought to Middlesbrough (via Darlington) and Durham coal would be taken to the Furness district (via Bishop Auckland).

Photo.] [*H. L. Hopwood.*

BARNARD CASTLE STATION, LOOKING WEST.

A little-known incident in railway history is the fact that at about this period the London & North Western Railway attempted to reach West Hartlepool and Newcastle by means of running powers over the South Durham & Lancashire Union, Newcastle & Carlisle and connecting lines. They purchased from the West Hartlepool Railway for the sum of £100,000 the whole of one side of West Hartlepool Docks and warehouses on the quay, but as Parliament refused to grant the necessary running powers, the

Digitized by Google

property was re-conveyed to the original owners

The South Durham & Lancashire line was boldly conceived and boldly engineered, for the engineer, Mr. (afterwards Sir) Thomas Bouch, carried it by means of long and severe gradients through the wild moorland country of Durham, North Yorkshire and Westmorland and over the Pennines, where, at Stainmore Summit, it reached 1,369 ft. above sea-level. This mountainous district is broken by several deep gorges, and these are bridged by a number of fine viaducts. The more important of the latter are set out in tabulated form above.

Name.	Spans. Number.	Spans. Width.	Length.	Greatest height.
		Feet.	Feet.	Feet.
Gaunless	4	120	640	93
Forthburn	4 2	35 15	248	43
Tees	2 5	21 120	732	132
Deepdale	11	60	740	161
Belah	16	60	1,040	196
Percy Beck..	6 2	30 13	260	66
Mouse Gill	6	30	244	106
Haty Gill	7 2	30 12	324	94
Merry Gill	9	30	366	78
Pod Gill	11	30	466	84
Smardale	14	30	553	90
Langley Dale	11	30	411	76

The Gaunless, Tees, Deepdale and Belah viaducts are of iron; the others of stone. Of the latter variety, Smardale viaduct is the largest, being 553 ft. long, with a maximum height of 90 ft. Between Barnard Castle and Kirkby Stephen are situated the three most notable viaducts—the Tees, Deepdale and Belah. Each of these consists of wrought iron lattice girders. Tees viaduct is supported on six stone piers, but in the case of those at Deepdale and Belah iron piers are employed. Each pier is composed of six cast iron columns (12 in. in diameter) arranged in two parallel lines of three each and braced together with cross girders at intervals of 15 ft., and also by horizontal and diagonal wrought iron tie bars. The width at the base is 50 ft., but the columns gradually taper inwards until, at the top, the piers are only 22 ft. wide.

With 16 spans of 60 ft., a total length of 1,040 ft. and a maximum height of 196 ft., Belah viaduct has always attracted a good deal of attention in engineering circles. According to official information, the foundation stone was laid by Mr. Henry Pease, Vice-Chairman of the railway, on November 25, 1857, and the bridge was finished in four months. Another account states that a record with the following particulars (which are obviously incorrect) was dropped down inside the middle column of the eighth pier:—

> "1,000 ft. long, 60 ft. span, 200 ft. high, 15 iron pillars and two stone buttresses. Commenced July 19, 1859; completed in 43 days."

In this account the length and height do not agree with official figures. Further, it is unlikely that a work of such magnitude occupied only 43 days. This same account commemorates completion of the bridge in the following lines:—

> "To future ages these lines will tell
> Who built this structure o'er the dell.
> Gilkes Wilson, with his eighty men,
> Raised Belah's Viaduct o'er the glen."

The South Durham & Lancashire Union Railway was publicly opened between Barnard Castle and Tebay (34½ miles) on August 8, 1861, but mineral trains

Digitized by Google

Photo.] [*Loco. Publishing Co., Ltd.*

TEES VIADUCT, BARNARD CASTLE.

had commenced to work over it a few weeks earlier. At the time of opening the passenger service consisted of two trains each way between Darlington and Tebay. A new station at Barnard Castle replaced the original one belonging to the Darlington & Barnard Castle Railway. The latter—about a quarter of a mile nearer the town than the present one—was a terminus situated at the end of a curve. This curve now forms the approach to the goods yard, alongside of which may still be seen the disused passenger station. The last section of this railway to be opened was that from Barnard Castle to Bishop Auckland on August 1, 1863. Part of it, from Evenwood to West Auckland, was the Hagger Leases branch of the Stockton & Darlington Railway, which had been in existence since 1830.

Like the Darlington & Barnard Castle, the South Durham & Lancashire when opened was a single-line railway, but the viaducts and bridges were built wide enough for two tracks, and a double line now runs for a considerable distance between Darlington and Tebay.

Extending from Kirkby Stephen to Eden Valley Junction on the London & North Western Railway, a distance of 21½ miles, the Eden Valley Railway was formed in 1858 for the purpose of bringing—in conjunction with the Cockermouth, Keswick & Penrith and South Durham & Lancashire railways—iron ore from West Cumberland to the Tees district. It was opened for traffic on June 7, 1862, and running powers were exercised over the London & North Western Railway from the point of junction into Penrith station (3¼ miles). In order to give mineral trains a direct run without going into Penrith to reverse, a connection was made from Eamont Bridge Junction, on the London & North Western Railway, to join the Cockermouth, Keswick & Penrith Railway at Red Hills Junction. This isolated portion of the North Eastern Railway is 1 mile 7 chains in length. When the Settle and Carlisle section of the Midland Railway was opened in 1875 a junction was formed between the two systems at Appleby. Originally, this connection was laid in south of the station, but was replaced by the present junction on the north side some years ago.

The Eden Valley Railway twice crosses the river Eden—first at Musgrave by an iron viaduct of 221 ft. in three spans of 63 ft., and again at Temple Sowerby by a similar bridge having four 98·3 ft. spans and a total length of 439 ft. There is also the Copeland viaduct, 200 ft. long, and composed of five 30 ft. arches.

The line which runs from Barnard Castle (Tees Valley Junction) to Middleton-in-Teesdale was made by the Tees Valley Company. Authorised in 1865 and opened May 12, 1868, it is a single line 7¾ miles long, built to serve a lead mining district. Middleton is also the nearest station to High Force, the famous Tees waterfall, 5 miles distant. There are two viaducts

Digitized by Google

on this section. That over the Balder Valley has nine arches each of 30 ft. span and is 100 ft. high. The Lune viaduct is of five 50 ft. arches and 60 ft. in height.

Brief reference has been made to two mineral lines which branch towards the south between Darlington and Gainford, the first at Merrybent Junction and the other at Forcett Junction. These lines were built by the Merrybent and Darlington, and Forcett Railways respectively, and were opened in 1870 and 1868. The first-named is notable for a fine viaduct over the Tees, a lattice girder erection with three 75 ft. spans and two land arches.

The South Durham & Lancashire, Eden Valley, Tees Valley and Forcett railways were all worked—as was the Darlington & Barnard Castle—by the Stockton & Darlington Railway, and the first two were absorbed by it on January 1, 1863, but the Merrybent and Darlington and the Tees Valley did not become part of the North Eastern system until 1890 and 1882 respectively. At one time the Merrybent Railway possessed its own engines. The Forcett Railway is still an independent company, although it is worked by the North Eastern Railway.

In July, 1863, six months after absorbing the South Durham and Lancashire and Eden Valley Railways, the Stockton & Darlington Railway itself was amalgamated with the North Eastern Railway. In contrast to the pioneer railway of 1825, with a main line then stretching from Witton Park Colliery to Stockton, the Stockton & Darlington Railway, by means of extensions and amalgamations, had become in 1863 a system with more than 200 miles of line and owning 157 engines. In the west its lines reached as far as Tebay and Penrith, two important places on the London & North Western Railway. The amalgamation of 1863 was not a complete one, as, for the next 10 years, the railway was managed independently by a joint committee. The locomotives were also kept distinct, and it was not until 1874 that they were brought into North Eastern stock, when they had 1,000 added to their numbers. Between 1863 and 1874 a considerable number of engines were built to Stockton & Darlington designs.

For working passenger trains over the Darlington-Tebay section, Mr. William Bouch, the Stockton & Darlington locomotive superintendent, designed two 4-4-0 tender engines, Nos. 160, *Brougham*,

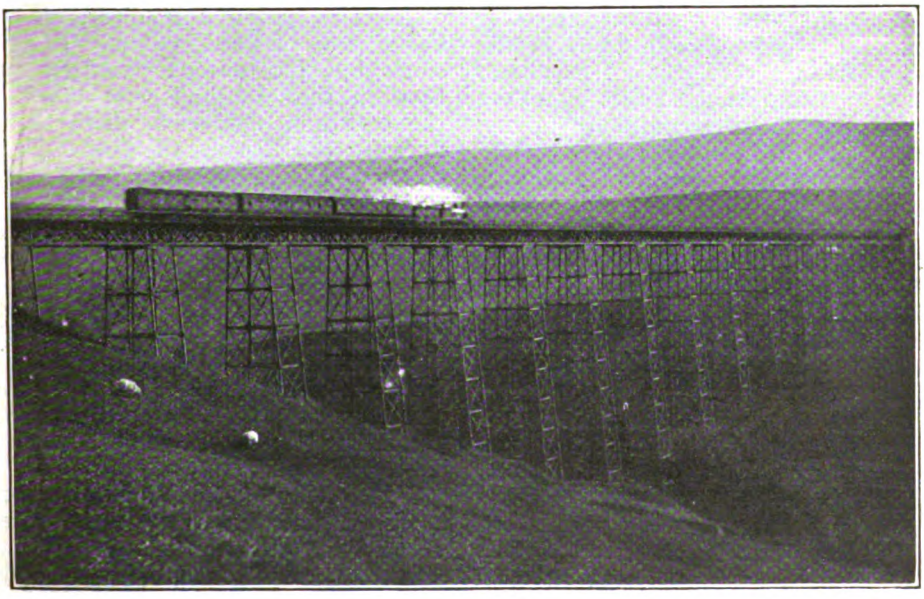


Photo.] [*Loco. Publishing Co., Ltd.*

DARLINGTON—PENRITH TRAIN CROSSING BELAH VIADUCT.

Digitized by Google

and 161, *Lowther*. They were built by R. Stephenson & Co. in 1860 and had leading bogies, four coupled wheels, 6 ft. in diameter, and outside cylinders, 16 in. by 24 in. Large cabs were provided, somewhat similar in appearance to the present style of North Eastern cab. In 1862–3 there came from the same makers *Saltburn*, *Morecambe*, *Belfast* and *Keswick*, Nos. 162–165—very similar engines to the last, but with 7 ft. wheels and minus the large cabs. Finally, Darlington works produced in 1871 the first of the famous "238" class ("Ginx's Babies"), of which there were 10 altogether, Nos. 238 (1871), 239 to 241 (1872) and 265 to 270 (1874). These engines were remarkable for a very long piston stroke (30 in.). In other respects they were like their predecessors, *i.e.*, they were 4–4–0 engines, but of increased dimensions, outside cylinders being 17 in. by 30 in., coupled wheels 7 ft. in diameter, and heating surface 1,217 sq. ft. Between 1875 and 1881 they were altered to 2–4–0 engines, with 17 in. by 26 in. cylinders, and in 1880 No. 162, *Saltburn* (then No. 1162) was similarly treated. They were reboilered from 1894 onwards and finally broken up six years ago.

Mineral trains on this section of line were worked by 0–6–0 engines, afterwards known as the "1001" class. In these engines all wheels were in front of the firebox. Always very efficient machines, the last lot had cylinders 17 in. by 26 in., wheels 5 ft. in diameter and boilers giving 1,432 sq. ft. of heating surface. Only a few of them now remain in service.

From the foregoing historical survey we pass to a description of the line as it is to-day, the train services and the method of working adopted at some of the stations.

At the time of opening, the 51¼ miles of railway between Darlington and Tebay was single line, but the greater part of it has since been doubled, and the only single-track portions now remaining are those (1) from Forcett Junction to the west end of Broomielaw station, (2) Barnard Castle platform line, and (3) from Kirkby Stephen West to Sandy Bank signal-box—about 12 miles in all. The Barnard Castle and Bishop Auckland line is double, except for 1¼ miles from Coal Road Crossing to Forthburn, two intermediate signal-boxes between Barnard Castle and Cockfield stations. The North Eastern curve from Eamont Bridge Junction to Red Hills Junction is double line, but all other branches are single, with the exception that on the Penrith branch there are two separate half miles of double track, viz., from Appleby to Midland Junction and from Clifton to Eden Valley Junction.

In going from Darlington to Penrith, a distance of 64¾ miles, four counties are passed through—Durham, Yorkshire, Westmorland and Cumberland. As far as Barnard Castle the line runs through pastoral country and is never far away from the Tees; in fact, between Gainford and Winston this river is crossed twice within the space of a mile. At Forcett Junction the track, hitherto double, becomes single and continues so to Broomielaw. This station has only one platform and, when necessary, trains cross each other at the western end, where the line is again double. On the ordnance map Broomielaw station is marked "private," but certain trains call to pick up passengers and mails. It finds no place in the public time-tables and even in the working time-table it appears only as a siding.

At Barnard Castle East Junction the branch from Bishop Auckland runs in on a sharply-falling gradient. Barnard Castle is a one-sided station, with only a single line for through passenger trains between the east and west boxes. At the east and west ends there are bay lines for the Bishop Auckland and Middleton-in-Teesdale branch trains respectively. Traffic working at this station will be referred to again when dealing with train services. The station appears to have been very little altered since its opening in 1861. The platform line is roofed over at that part where the offices are situated, the roof being supported by an outside wall. On the other side of this there are up and down running roads for mineral trains, extensive sidings and an engine shed.

Leaving the station, the river Tees is again crossed by the viaduct already mentioned, and from the train surprisingly fine views are obtained, both up and down the river. A short distance away is Tees Valley signal-box, the junction for the Middleton-in-Teesdale branch. The latter runs parallel with the main line for some

Digitized by Google

way before turning north. This 7¾ miles branch is worked on the staff system, there being no crossing places *en route*. The three intermediate stations and the terminus are all of the single-platform type. In pre-war days there was a particularly fine floral display at Middleton station, and the waiting rooms exhibit a large number of certificates awarded by the company to the stationmaster. Although the town of Middleton is in Durham, the station is on the Yorkshire side of the river, and for its entire length the line is in that county, which was entered after crossing the Tees Viaduct at Barnard Castle.

(*To be continued.*)

A REMARKABLE AMERICAN 4-4-2 LOCOMOTIVE.

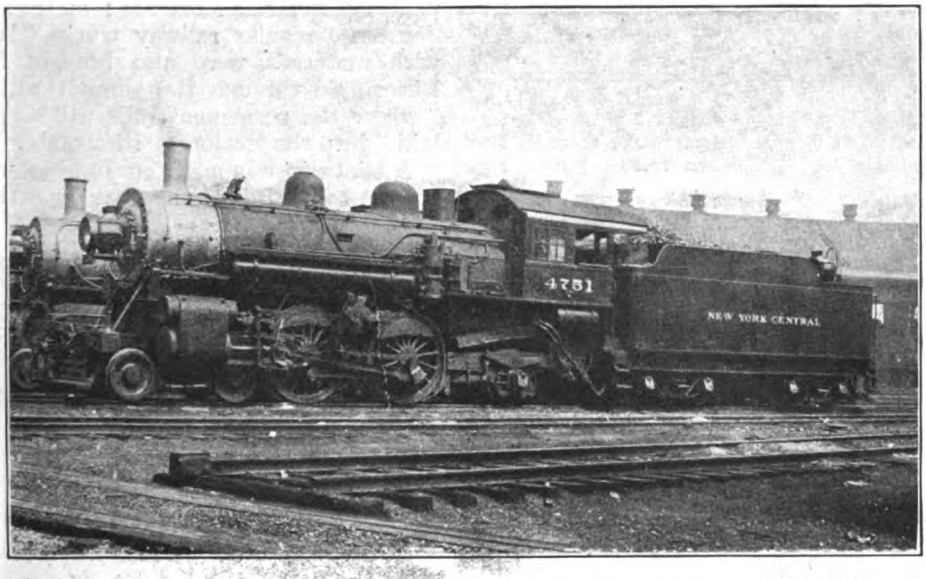


Photo.] [*Arthur Curran.*

SMALL 4-4-2 LOCOMOTIVE, NEW YORK CENTRAL RAILWAY.

IN sending the photograph reproduced above, Mr. Arthur Curran, of New York, states that among the many special designs evolved by the motive power department of the Lake Shore and Michigan Southern Railway prior to its amalgamation with the New York Central system, "none is, perhaps, more puzzling than the 4-4-2 engine shown in the enclosed photograph." The engine is quite small for its type, and was probably intended for mixed traffic duties. As far as Mr. Curran is aware the class has never been illustrated in any of the railway journals, and he has been able to find out very little about it. The tender is very large and has a head-lamp at the rear. These engines, of which there were only a few, principally worked west of Buffalo.

Digitized by Google

The Barnstaple and Ilfracombe Railway. [No. III.]

By FRANK E. BOX.

(*Continued from page 29, January, 1920.*)

The Devon and Somerset in the meantime, had reached Barnstaple, and in March, 1874, took offices in Ilfracombe, preparatory to inaugurating a fast coach service between the two towns. This service started on June 1, and was advertised to give the following connections with Bristol and London :—

		a.m.	a.m.	p.m.
Ilfracombe ..	.. dep.	7.15	8.30	1.30
Bristol ..	.. arr.	12. 4	2.35	6.45
Paddington ..	.. arr.	2.45	6. 0	10.20

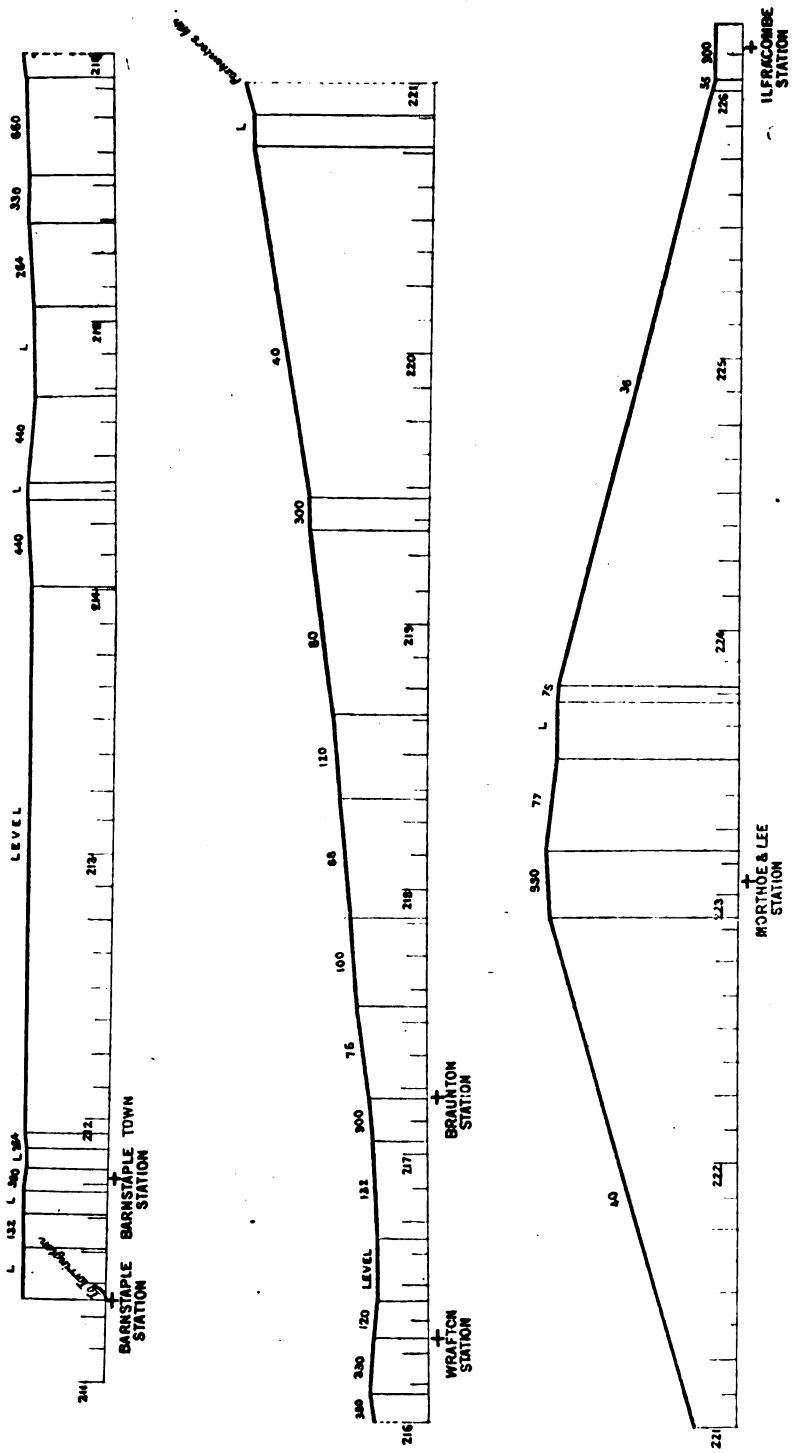
		a.m.	a.m.	a.m.
Paddington ..	.. dep.	—	6. 0	11.45
Bristol ..	.. dep.	6.15	10.30	2.26
Ilfracombe ..	.. arr.	12.20	5.10	7.15

Progress of the railway was eagerly watched by the inhabitants during the spring and summer of 1874. The first engine with 10 trucks (evidently contractor's stock) passed through the short tunnel above Ilfracombe, and on to the station on March 16. Three months later, on June 16, the first locomotive passed over the bridge at Barnstaple amidst the cheers of the spectators, proceeding the next day as far as Mortehoe; on the same day six "regular railway trucks," laden with materials, were also brought from Barnstaple through the summit cutting, "where the permanent rails will soon be laid" into the station at Ilfracombe.

A trial trip was made on June 30, when a train consisting of one first, one third,

Photo.] THE TUNNELS—LOOKING DOWN GRADE OF 1 IN 36. [*F. E. Box.*

Digitized by Google



GRADIENT PROFILE, BARNSTAPLE TO ILFRACOMBE, LONDON & SOUTH WESTERN RAILWAY.

Digitized by Google

and four second class carriages, with two brake-vans lettered "Barnstaple and Ilfracombe," and drawn by engines Nos. 282 and 283, decorated with flags, left Barnstaple at 3.55 p.m., with several officials, including Messrs. Church and Jacomb, the engineers, and Mr. Taylor, the contractor. The swing bridge over the Yeo was thoroughly examined and lengthy stops were made at all the stations. From Braunton the train was taken forward by one engine up the incline, which finally steepens to about 3½ miles of 1 in 40 to Mortehoe; the brakes were tested by allowing the coaches to run back by themselves on the steepest grades, the other engine following the train up the bank. Ilfracombe was eventually reached about 6.20 p.m., No. 283 running in first as pilot, hundreds of people, including the Rev. Price, being at the station to meet the train. It was found that one engine could easily haul a load of 83 tons up the bank of 1 in 36. The return journey was commenced at 7.10 p.m., and was completed in about an hour.

The Board of Trade inspection was undertaken on July 13 by Colonel Hutchinson. Travelling by special train from Exeter he commenced operations at 8 a.m., accompanied by Messrs. A. Scott (manager) Galbraith, Jacomb, Church, and Fisher (engineers), Tyler (traffic superintendent), and Higgs (superintendent Loco. Dept.), all of the London and South Western Railway, and by Mr. Taylor, the contractor. Two locomotives, totalling about 80 tons, were used for testing the bridge at Barnstaple, which occupied about two hours. The inspector's train, which consisted of engine, five coaches, and van, was followed by another locomotive, and finally reached Ilfracombe shortly before 3 o'clock.

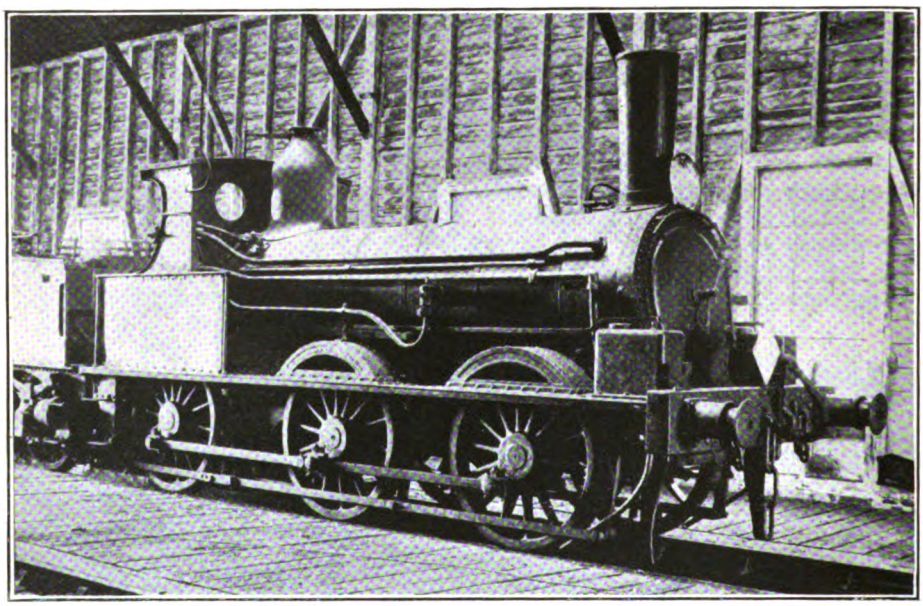


Photo.] [*F. E. Box.*

OLD ILFRACOMBE 0-6-0 ENGINE, No. 394, IN BARNSTAPLE RUNNING SHED

On the Saturday previous to the public opening a train drawn by two locomotives left Barnstaple Junction about 9 a.m., conveying Mr. Scott and Mr. Tyler, with the staff and furniture for the stations on the line, which were placed under the charge of the following stationmasters:—

Barnstaple Quay ..	Mr. Heather, in charge of the Junction Station, who now had control of both stations.
Wrafton	Mr. Tucker, an old guard.
Braunton	Mr. Ridge, formerly stationmaster at Instow.

Digitized by Google

Mortehoe	Mr. Rice, well known at Barnstaple Station, and previously a coachman on the Exeter Road.
Ilfracombe	Mr. King, formerly station-master at Torrington.

On Monday, July 20, 1874, the first passenger train, consisting of two engines (No. 282, driven by Driver Robert Whitehorn, being in front, the other was attached in rear) and twelve coaches left Ilfracombe in charge of Guard Lethaby within a minute of the advertised time, 6.35 a.m. Several passengers were booked, and amid the cheers of the spectators and the ringing of the church bells the train started up the 1 in 36 bank for Barnstaple, which was reached rather before time, about 7.30 a.m. "Alarm signals" had been placed on the rails, and the passage of the train along the quays was greeted by several volleys fired from the shipbuilding yard of Messrs. Westmacott opposite.

The first down train, the 8.50 a.m. from the Junction Station, left at 9.10 with thirteen "on," and, of course, two engines. Amidst great enthusiasm some 300 Barumites booked for Ilfracombe, and a similar busy scene having occurred at Braunton the two little locomotives steadily hauled their heavy load up and around the curves to the summit at Mortehoe, then plunging with grinding brakes down the steeper descent they carefully brought their train to a standstill at the terminus at Ilfracombe; so was the first trip completed, and the regular train service inaugurated.

Official celebration of the opening was duly observed in the town on the following day when the usual festivities took place, the station and yard being decorated with the flags that had been used at Windsor on the occasion of the Czar's visit earlier in the year. A procession met the train bringing the invited guests, and at the public banquet which followed, the consummation of the many years of toil on behalf of the railway, which, by some strange fatality, had seemed destined never to reach completion, was enthusiastically marked by felicitous speeches.

The train service provided on the opening of the line was as shown in the table below.

Thus Waterloo was brought within 7 hr. 18 min. down, and 7 hr. 52 min. up of Ilfracombe; this compared with 7 hr. 30 min. in both directions from and to Paddington by the Devon and Somerset's competitive rail and coach service. The time by the South Western was gradually reduced until in July, 1884, 6 hr. 30 min. sufficed; by July, 1891, it had been reduced to 5 hr. 57 min., and to 5 hr. 14 min. by July, 1905.

The service attained its highest level in the summer of 1908, when no less than 17 passenger trains were booked over the branch in each direction, and both the 11.10 a.m. and 3.30 p.m. expresses from Waterloo completed the journey in 5 hr. 14 min., as also did the 11.15 a.m. up from Ilfracombe.

The opening of the Barnstaple Junction Railway in 1887, uniting the Great Western and South Western lines allowed through coaches to be run between the Great Western system and Ilfracombe; the completion of the Castle Cary and Langport link-line on July 2, 1906 brought Paddington within 4 hr. 55 min. of Ilfracombe.

To accommodate the Ilfracombe line traffic the down platform at Barnstaple Junction was constructed and brought into use in May, 1874; previously the whole of the traffic was dealt with at one platform only.

Speed over the whole line, which was single throughout, was limited to 25 miles per hour. Flat bottom rails spiked

				Fast		Fast Exp.
Waterloo	dep. ..	..	6.45	10.45	11.50	2.10
Exeter	dep. 7.0	10. 0	1.25	3.55	6.35	6.35
Barnstaple Junction	arr. 8.50	12. 0	3.28	5.40	8.25	8.25
Ilfracombe	arr. 9.52	1. 3	4.28	6.43	9.28	9.28
	Fast Exp.		Fast			
Ilfracombe	dep. 6.35	6.35	10.10	2. 0	7.20	..
Barnstaple Junction	dep. 7.47	7.47	11.12	3. 0	8.25	..
Exeter	arr. 9.33	9.33	12.37	4.33	9.58	
Waterloo	arr. 2.27	4.46	6.10	10.50	..	..

Digitized by Google

directly to the sleepers were used, except over the bridge at Barnstaple and on the heavy grades from Headon Mill to Ilfracombe.

With the exception of a length of about seven furlongs, from Barnstaple Junction to Pottington Level Crossing, which still remains single, the line has been doubled, the sections being completed as follows:—Braunton to Mortehoe, July 1, 1889; Pottington to Braunton, August 4, 1890, and Mortehoe to Ilfracombe, July 1, 1891. The present town station at Barnstaple was built to accommodate the Lynton and Barnstaple Railway, opened in 1898, the original "Quay" station nearer the bridge being closed, the property reverting to the Corporation.

The load of the original Ilfracombe engines, viz., Nos. 282, 283, 284, 300, 301, 324, 393, and 394, was limited to 28 wheels over the banks. Nos. 282 to 284 were delivered by Beyer, Peacock & Co. in 1873, and as originally built weighed 25 tons 16 cwt., and were provided with 4-wheeled tenders weighing 13 tons 12 cwt. Principal dimensions were: cylinders, 16 in. by 20 in.; 6-coupled wheels, 4 ft. 7½ in. diam.; boiler, 9 ft. 3 in. by 3 ft. 8 in.; working pressure, 130 lb.; the engines had padded leather buffers. Subsequently Nos. 300 and 301 were delivered by the same builders in June, 1874, and No. 324 in October, 1875, followed by Nos. 393 and 394 in 1880. With the exception of the two latter these engines were all rebuilt between 1888 and 1890 with enlarged boilers, 4 ft. diam., the pressure being increased to 160 lb., and the weight to 26 tons 12 cwt., six-wheeled tenders weighing 20 tons 15 cwt. being provided. No. 82 was renumbered 349. A photograph of No. 394 taken at Barnstaple in 1907 is reproduced.

In the Autumn of 1907 the line was being worked principally by Adams' tanks, Nos. 1, 2, 4, and 69, fitted with the steam-chests below the cylinders, and Nos. 361, 363, and 367, which had the steam-chests between the cylinders. For the month of September, 1907 No. 367 averaged only 23·8 lb. of coal per mile; the consumption of the whole seven averaging 29·7 lb.; their unaided load over the banks was restricted to 44 wheels. The Drummond tanks at present working the line are allowed 48 wheels unassisted.

In actual working Adams' tanks Nos. 1 (load 69 tons), 361 (69 tons), 363 (94 tons), and 367 (109 tons), took 45, 45, 48, and 58 sec. respectively for the fastest quarter-mile up the 1 in 36 bank; while Drummond tank No. 25 with 116 tons took 54 sec.

In conclusion the indulgence of readers is desired should they have felt that certain events have been dealt with at undue length; written for the most part some years ago, it seemed right to make this record of the exertions of a past generation to provide railway accommodation to this part of North Devon as complete as possible. In this endeavour the writer has been helped by many who are no longer living, particularly would he acknowledge his indebtedness to the late Miss A. E. Price, daughter of the Right Rev. Benjamin Price, and to the late Mr. Moore, proprietor of *The Ilfracombe Chronicle*, for much of the material placed at his disposal; the sincerest thanks are also due to the proprietor of *The North Devon Journal*, for the use of the files of that newspaper, and to the many officials and employees of the London & South Western Railway, who have rendered the task a pleasant one by their courtesy and West Country kindliness.

Digitized by Google

Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. X.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

IN 1896–1901 the "1667" class, with Joy's valve gear, were practically scrapped and renewed with piston valves and link motion, and with entirely new frames. Ten similar engines were also built at Derby in 1897, Nos. 150, 153 to 155, and 204 to 209, and in 1899 Nos. 2421 to 2440 came out from the works of Sharp, Stewart & Co. These engines had 7 ft. coupled wheels, 19 in. by 26 in. cylinders with piston valves, and the boiler carried 160 lb. pressure. The heating surface was 1,223 sq. ft., of which the firebox had 117 sq. ft. Nos. 1667 to 1676 were divided between London, Nottingham and Derby sheds, though 1675–6, the London engines, were shortly afterwards transferred to Bedford. Nos. 150 and 153 to 155 were at Leicester for both London and Manchester runs, 204 was at Birmingham, and 205 to 209 at Manchester. Of the 1899 engines, Nos. 2421 to 2435 were at Nottingham, and 2436 to 2440 at Leeds. Though they did some very good work, I never had any exceptional experiences behind any of them, except perhaps a short run from St. Albans to Kentish Town, behind No. 1676, with 130 tons, in which the distance of 18¼ miles was covered, start to stop, in 19 min 5 sec., a running average of 57·6 m.p.h.

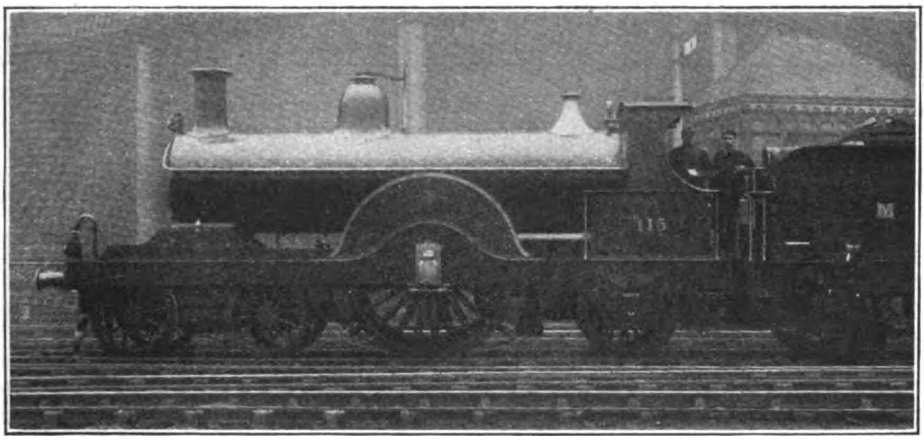


Photo.] [*Loco. Publishing Co., Ltd.*

4-2-2 ENGINE, No. 115 (SERIES 115-121, 123-128, 130-131).

Built at Derby, 1896–9. Cylinders, 19½ in. by 26 in. Driving wheels, 7 ft. 9 in. diam. Steam pressure, 170 lb. per sq. in.

In 1896–7 there came out from Derby the five 7 ft. 9 in. "singles," Nos. 115 to 119, followed in 1899 by ten more, Nos. 120, 121, 123 to 128, 130 and 131. These were undoubtedly amongst the finest single express engines ever constructed. They have 7 ft. 9 in. driving wheels and 19½ in. by 26 in. cylinders. The boiler carries 170 lb. pressure and has a total heating surface of 1233 sq. ft., towards which an enlarged firebox contributed 128 sq. ft. Another point of departure

Digitized by Google

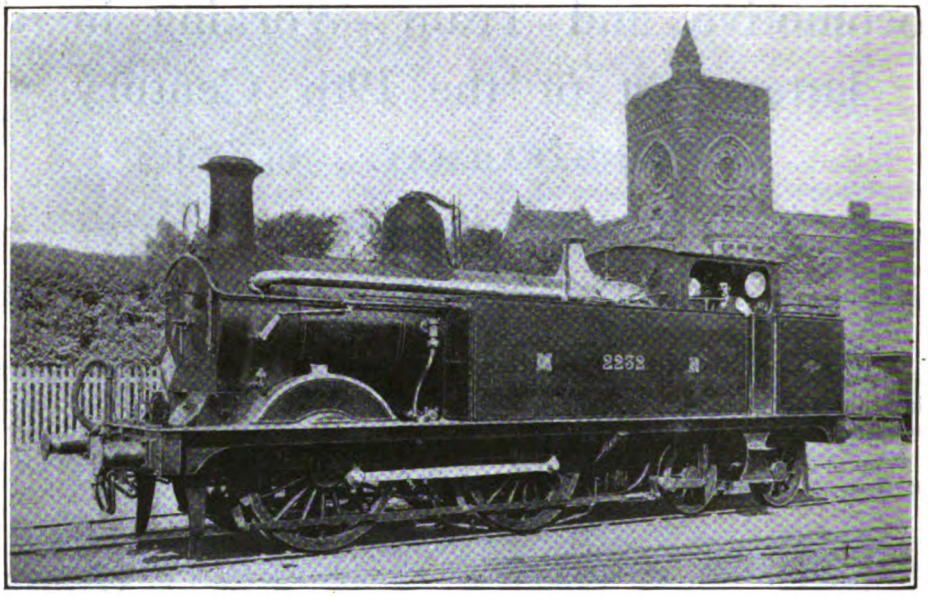


Photo.] [*Loco. Publishing Co., Ltd.*

0-4-4 CONDENSING TANK ENGINE FOR LONDON SUBURBAN TRAFFIC.

Designed by Mr. S. W. Johnson, and built, 1895, by Dubs & Co. Coupled wheels, 5 ft. 3 in. diam. Cylinders, 18 in. by 24 in. Steam pressure, 150 lb. per sq. in.

from previous Midland practice was the provision of larger bogie wheels, 3 ft. 9½ in. in diameter.

The "115" class were stationed as follows:—Nos. 115, 120, 121 and 123 to 125 at Nottingham, to run the London expresses over both the Melton and the Leicester routes, 116 to 118 were at Kentish Town, 119 and 128 at Bristol, 126 at Birmingham and 127 at Derby. Nos. 130 and 131 were at Kentish Town for about a year until the newer "2601" class appeared, when these two engines were removed to Derby to work the Bristol expresses, whilst 127 was removed from Derby to Bristol.

These 15 engines performed some of the best and most brilliant work ever done on the Midland. The records of the late Mr. Rous-Marten include a run from London to Bedford, with 160 tons, 49¾ miles, in 53½ min., start to stop, and thence on to Leicester, 49½ miles, in 55½ min. For the benefit of readers who belong to other railways, I may repeat that the London–Bedford stretch includes banks of 1 in 168 and 1 in 176, and the difficult road from Bedford to Leicester includes the ascent of three banks, viz., one of 4 miles at 1 in 100 and 1 in 120, one for 9 miles, much of which is at 1 in 132 and 1 in 136, and one of 1 in 170 for 4 miles. On another occasion the same engine took a train of 200 tons over the Bedford–Leicester portion in 57¾ min., maintaining 49 m.p.h. up 1 in 132. A short time afterwards the same observer recorded a speed of 90 m.p.h. with No. 117 and a sustained speed of over 80 m.p.h. for more than 13 consecutive miles. The tested coal consumption of one of them was 24·56 lb. per mile between London and Nottingham, with 10¼ coaches, at a mean actual speed of 54·24 m.p.h.

One of the best performances that came under my own observation was that of No. 125, from Kettering to Nottingham, with an exceptionally heavy train of 325 tons, and disposes of the rooted idea that a single engine cannot tackle a heavy load. The booked time for the 51¾ miles was 59 min., and the road is a heavy one. Extra coaches had been added at Kettering, and as no pilot engine was to be had, No. 125 had to take the train unassisted. The 5-mile rise from the

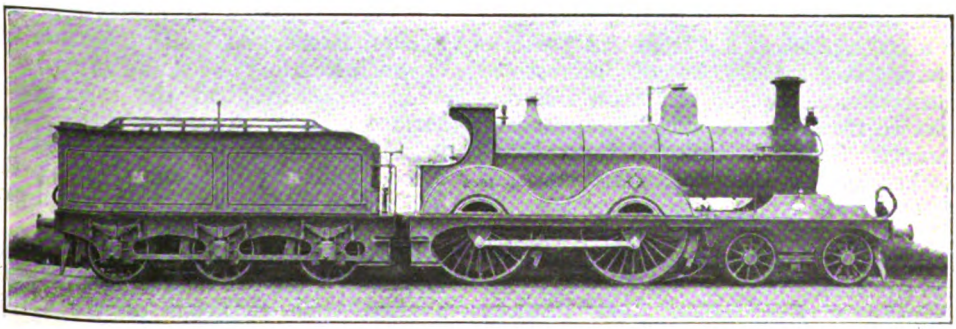
Digitized by Google

dead start up 1 in 132 and 1 in 160 took exactly 11 min., leaving 48 min. for the 46½ miles thence to Nottingham. There are moderately long banks of 1 in 143, 1 in 167 and 1 in 200 to be ascended, and there is a severe handicap at Melton Junction, where a slack to about 25 m.p.h. is followed by a 3¾-mile rise of 1 in 200. No. 125 took the train from Kettering to Nottingham in 60¼ min., and would have kept exact time had not a relaying slack at Widmerpool, on the descent to Nottingham, caused a loss of 1¼ min.

During the last few years of the nineteenth century three important new lines were opened by the Midland. Taking them in their order from south to north, the first was the Tottenham & Forest Gate Joint Railway from South Tottenham to the London, Tilbury & Southend Railway. Express trains were afterwards run between St. Pancras and Southend over this line, and the 4-4-0 7 ft. engine, 1757, *Beatrice*, was, as stated previously, quartered at Shoeburyness for these trains. In later years they were handed over to the London, Tilbury & Southend Railway 4-4-2 tank engines, and eventually, in 1912, this connecting line was the direct cause of the complete amalgamation of the London, Tilbury & Southend Railway with the Midland.

The second opening was that of the Saxby and Bourne cross-country line, which made a connection between the Midland Counties and the Midland & Great Northern Joint Line. This latter railway—the old "Eastern & Midlands"—was from 1894 worked by joint locomotives of Midland design, and the Midland then handed over to the joint company the locomotive working between Peterborough and Lynn. But this section of the line, though of great use to the Great Northern, was of very little benefit to the Midland, hence the new Saxby and Bourne line, which belongs to the Midland as far as Little Bytham Junction signal-box, 5 miles from Bourne, where it crosses the Great Northern main line. From this point to Bourne the line is joint property. A new service of trains was inaugurated from Birmingham and Leicester to Cromer, Norwich and Yarmouth, which has since become very popular. At first the Birmingham engine ran through to Bourne, and the old rebuilt Beyer-Peacock engine, No. 198A, was the one usually employed, together with the Leicester engines of the "1492" class. This working has, however, been altered during the present century, for the fastest train is now worked to and from Leicester by a Midland and Great Northern Joint engine stationed at Norwich. A Midland engine from Nottingham, however, ran through to Bourne daily, and the Midland goods engines frequently ran cattle and other trains as far as Lynn.

The third new line was the direct branch connection from Sheffield to Barnsley, which left the Sheffield and Masborough main line near Wincobank, and passed through Chapeltown. The local trains on this line have generally been worked



4-4-0 ENGINE, No. 2591 SERIES 2591-2600).

Designed by Mr. S. W. Johnson. Built by Nelson, Reid & Co., 1901. Coupled wheels, 7 ft. diam. Cylinders, 19 in. by 26 in. Steam pressure, 170 lb. per sq. in. This engine was shown at the Glasgow Exhibition, 1901.

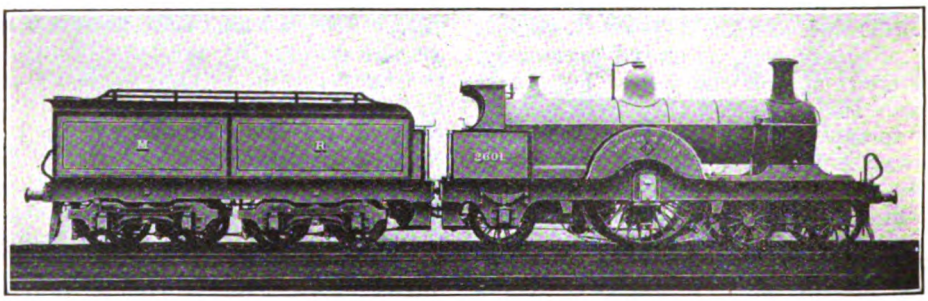
Digitized by Google

from the opening by the 0–4–4 bogie tank engines, Nos. 2238 to 2247 (now 1391 to 1400), stationed at Sheffield. These engines also began to work the Cudworth and Barnsley branch trains, which for many years had been under the charge of a six-coupled goods engine from Normanton shed.

But the importance of the new line was greatly increased in 1899 by the opening in that year of a connecting line, which left the new Barnsley branch at Monkspring Junction, a little to the north of the Midland station at Wombwell, and joined the old main line south of Cudworth. This connection gave an alternative and shorter route between Sheffield and Leeds, which is used by a number of the express trains. But although the distance has been reduced from 39½ to 37½ miles, the gain is offset by the much heavier gradients which from Wincobank Junction to Hoyland Summit are very severe, and there is a corresponding fall from this point to Cudworth. It may be of interest to those readers who do not know this district to mention that until the war the through Sheffield and Hull expresses worked by the Hull & Barnsley engines generally used this new route, but the competing trains of the North Eastern Railway had necessarily to travel *via* the old Masborough line as they take the Swinton & Knottingley Joint Railway from Swinton Junction.

In 1898 Mr. Johnson turned out from Derby the first ten engines of the new "60" class, of the 4–4–0 type, with the now standard piston valves, and enlarged fireboxes. Until 1892 the standard firebox for the coupled engines had always had 110 sq. ft. of heating surface, and in that year 117 sq. ft. was obtained for new engines by increasing the wheelbase of the coupled wheels to 9 ft. In the "60" class this wheelbase was again increased to 9 ft. 6 in., and a firebox with 128 sq. ft. was therefore made possible. The tube surface was, however, only 1,105 sq. ft., so that the total did not exceed 1,233 sq. ft. Mr. Johnson, however, had hitherto held to the opinion that a large firebox made up for any sins of omission in the matter of tube heating surface. The pressure in the new engines was 170 lb.

The first 15 engines of the "60" class had 19½ in. by 26 in. cylinders, the wheels of all of them being 7 ft. in diameter. These engines were Nos. 60 to 66, 93, 138 and 139, built in 1898, and 67 to 69, 151 and 152 in 1899, but the last five engines of 1899, Nos. 165 to 169, had only 19 in. cylinders. They were followed in 1901 by 20 similar engines, with 19 in. cylinders, of which Nos. 805 to 809 and 2636 to 2640, built at Derby, had the tube heating surface slightly reduced, so that the total became 1,205 sq. ft., and Nos. 2591 to 2,600, built by Neilson, Reid & Co., had a still further reduction, which gave a total of only 1,193 sq. ft.



4-2-2 "SINGLE" LOCOMOTIVE, No. 2601 "PRINCESS OF WALES" (SERIES 2601-2605, 19-23).

Built at Derby and exhibited at the Paris Exhibition, 1900. Cylinders, 19½ in. by 26 in. Driving wheels, 7 ft. 9½ in. diam. Steam pressure, 180 lb. per sq. in.

Of these engines Nos. 60 to 69 went to Leicester, after No. 60 had been tried for a short time at Leeds on the Carlisle road; 93, 138 and 139 were at Derby and afterwards at Bristol on both the Manchester and the Bristol trains, and 151 and 152 went to Nottingham. These engines, with 19½ in. cylinders, always appeared to me to be over-cylindered.

Digitized by Google

I never had any records with any of them that showed special merit. But the 19 in. engines seemed to be very different, and did some very fine work with heavy trains in spite of their small tube heating surface. Nos. 165 to 169 were on the Bristol-Derby trains; 805 to 809 at Carlisle, and 2636 to 2640 at Leeds were principally on the Carlisle road; whilst 2591 to 2598 were at Leicester and 2599 and 2600 at Kentish Town.

With several engines of the "2591" class which used to run the up afternoon 4.2 p.m. Scotch express from Leeds I have more than once passed Kilnhurst, 30¼ miles from the dead start, in 32 min., with a heavy train of 250 to 270 tons. Mr. Rous-Marten had several fine records with these engines. On one occasion No. 2597, with a 300-ton train, ran from St. Pancras to Leicester in 111½ min. Nos. 2636 and 2637 together ran the same 300-ton train from Leeds to Carlisle (112¾ miles) over the Ais Ghyll Summit in 127½ min. running time, *i.e.*, deducting the actual time stopped at Ais Ghyll to put off 2636. From the dead start at Ais Ghyll to Carlisle No. 2637 took the train on in 46 min. 41 sec. for the 48¼ miles. The net time from Leeds, allowing for slacks, was only 123½ min.

(*To be continued.*)

SURRENDERED GERMAN LOCOMOTIVE CONSIGNED TO POLAND.

Photo.] [*E. Hildbrand.*

According to the terms of the Armistice, Germany surrendered to the Allies large quantities of railway material. Of the engines so given up, a number have been sent to Poland, and the illustration depicts one received by the United States Army in France and photographed at Zurich *en route.* They enter Switzerland from France at Pontarlier and are usually hauled "dead" in two's by Swiss locomotives, though some are moved in goods trains. Austrian territory is entered at Büchs, *en route* to Budweis in the new kingdom of Czecho-Slavokia, and so to Poland. Many of these engines bear traces of the war, broken cab windows, &c., and all are dirty and unpainted.

Digitized by Google

Feltham Concentration Yard:

LONDON & SOUTH WESTERN RAILWAY.

MOST of the marshalling yards in Great Britain have grown up piecemeal from very small beginnings. They have been added to from time to time as the traffic grew, consequently there are comparatively few examples in this country of yards which have been scientifically laid out to deal with a big volume of traffic. Particular interest therefore attaches to a very bold step which the directors of the London and South Western Railway have taken, on the advice of their General Manager, Sir Herbert Walker, in constructing an entirely new concentration yard for dealing with freight traffic between different parts of the South Western system and their great goods depôt at Nine Elms, and also the heavy exchange traffic to and from the London and North Western at Willesden, the Great Central Railway at Neasden, the Midland Railway at Brent and the Great Northern and Great Eastern systems via the North London line.

At present, owing to lack of a concentration point, northern traffic to and from points on the South Western system has to be dealt with by services quite distinct from those conveying the traffic flowing between Southampton, Bournemouth and the west and the goods depôt at Nine Elms. But by the provision of Feltham Yard a common point will be afforded to and from which all this traffic will work, except of course complete train loads of perishable and other urgent traffic from the south and west or between Southampton and Nine Elms. Despite the war, and consequent shortage of labour and scarcity of materials, the construction of the Feltham Yard has been steadily proceeded with, and a portion of the yard, that is to say that section which will ultimately form the up-reception sidings, has been brought into use as a temporary yard to afford relief to the exchange sidings at Brent, which, owing to increasing traffic, were being taxed beyond their capacity.

Feltham Yard is situated on the route used by trains working between Waterloo and Reading and Windsor, and will therefore relieve the main line between Weybridge and Clapham Junction of all freight trains except a certain number of through trains with perishable and other urgent traffic from Southampton and the west to Nine Elms. Up trains will be diverted from the main line at Byfleet Junction and follow the route via Chertsey, Virginia Water and Staines Junction, at present used by trains conveying traffic between the South Western system and northern lines.

Arrived at Feltham the main line engines will be sent to shed and the trains broken up, the exchange traffic for the northern lines and the traffic for Nine Elms and branch lines in the London area being conveyed thence by local services. The route followed by the services conveying exchange traffic to and from the northern lines will be via Hounslow, Brentford and the North and South West Junction Railway, whilst the services working between Feltham and Nine Elms will run via Twickenham, Richmond (or Brentford and Chiswick), Barnes and Putney on the Windsor line.

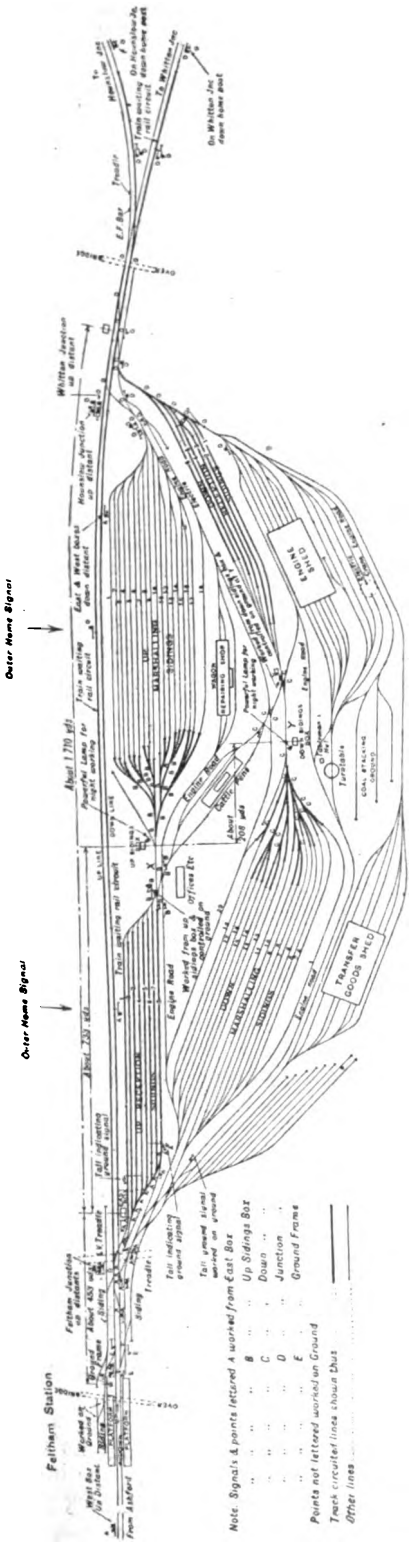
It will thus be seen that the Feltham site, apart from the land being very suitable for the layout of a concentration yard, is also a very desirable location from the traffic working point of view, as a common point is provided to which all up freight traffic can be worked from various points on the London and South Western system. Similarly, in the down direction, the local services will convey traffic from the northern lines, and also from Nine Elms and other London depôts to Feltham, whence through trains will be made up for Southampton, Portsmouth, Salisbury and the west, &c.

Put very briefly, some of the advantages in operation to be secured by the new marshalling yard at Feltham will be:—

(*a*) Relieving the main line between Weybridge and Clapham Junction of goods trains;

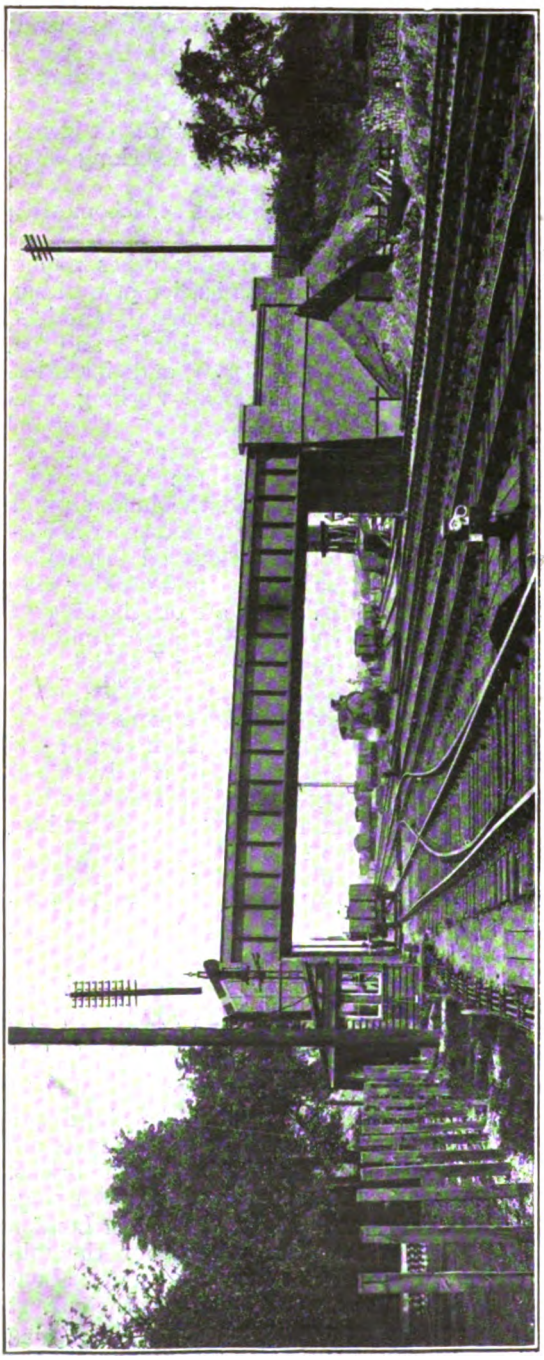
(*b*) The elimination of duplicate services

Digitized by Google


Feltham Station
Outer Home Signal
Outer Home Signal
Note: Signals & points lettered A worked from East Box
" " " " B " Up Sidings Box
" " " " C " Down "
" " " " D " Junction "
" " " " E " Ground Frame
Points not lettered worked on Ground
Track circuited lines shown thus
Other lines
Tail indicating ground signal
Tail ground signal worked on ground
Engine Road
Engine Road
Engine road
Engine road
Train waiting rail circuit
Train waiting rail circuit
Train waiting rail circuit
Train waiting rail circuit
Up Sidings
Down Sidings
Up Sidings
Down Sidings
Transfer Goods Shed
Turntable
Coal Staging
Sidings
Sidings
Sidings

abutments being of similar construction to the river culvert.

The new bridge has already been completed, and the culverts are rapidly approaching completion, and about 120,000 cubic yards of the earthwork has been completed. Altogether the yard will involve 250,000 cubic yards of earthwork, 120,000 cubic yards being excavation and 130,000 cubic yards filling. It will thus be seen that the amount of excavation and filling very nearly balance. The yard will be laid with chaired rails, the weight of which varies from 82 lb. to 95 lb. per yard, according to location, the lighter rails being used for the sheds and cripple roads.



NEW STEEL GIRDER BRIDGE AT WESTERN END OF YARD.

In the Feltham Yard the Traffic and the Engineering Departments have co-operated from the outset of the scheme. In the first instance a small combined committee was formed which made a careful study of the layout of various yards at home and abroad, and visited a number of them, such as Wath and Toton.

General features of the Feltham Yard are clearly shown on the plan reproduced on page 91. The yard is of the through and through type, thereby avoiding all backward movement of wagons. An interesting feature is the liberal provision of reception sidings, the proportion on the up side being 8 reception roads to 16 roads in the marshalling sidings. This should enable up trains from the south and west to be received in quick succession, the train engine sent to shed, or immediately turned round for a down trip, and the wagons dealt with as and when convenient by the yard staff. On the down side the proportion of reception sidings to marshalling sidings is somewhat less, being 6 to 17, but the down reception sidings have only to deal with local services from Nine Elms, branch lines in the London area and the northern lines. A second group of sidings at the end of the down marshalling sidings is also provided for sorting down line wagons into station order.

Particular interest attached to the humps. The summits of these are 7 ft. 3 in. above the level portion of the marshalling sidings.

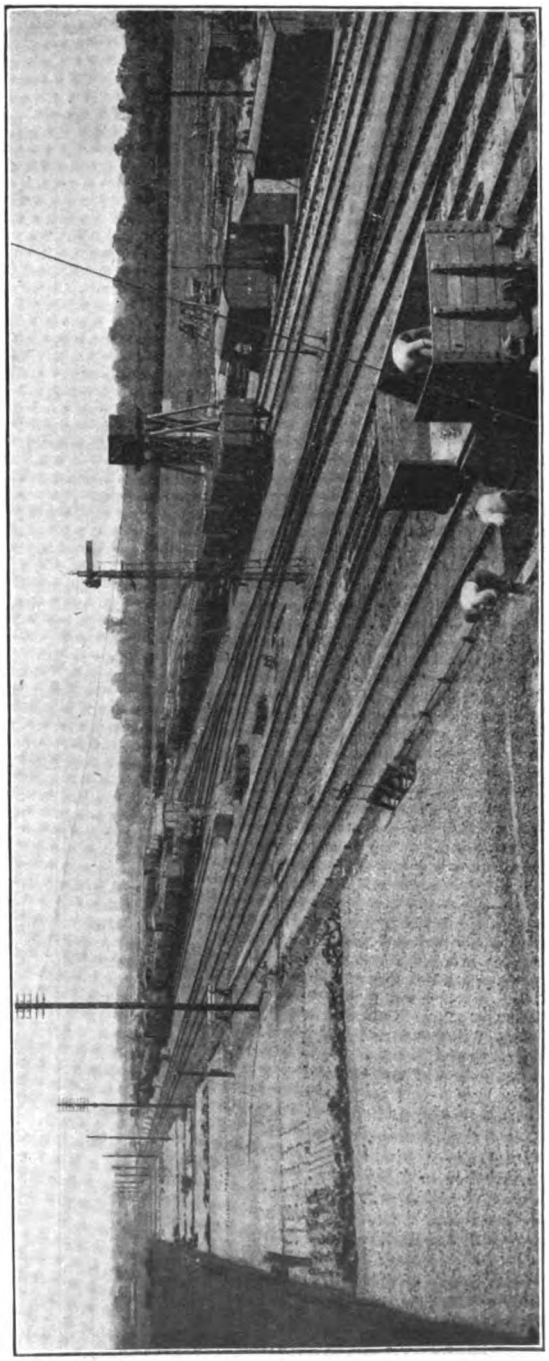
Digitized by Google

On the up side the reception sidings are laid at 1 in 5,000 and there is a grade of 1 in 40 for 130 ft. to the summit of the hump, which is flat for 40 ft. From the summit of the hump to the marshalling sidings there is a fall of 1 in 50 for 170 ft. and then of 1 in 150 for 580 ft. The down reception sidings are on a rising gradient of 1 in 223, and there is a gradient of 1 in 60 for 235 ft. to the summit of the hump. The gradient from the top of the hump to the marshalling sidings is the same as on the up side at 1 in 50 for 170 ft. and 1 in 150 for 575 ft. The reason for the slight differences in the gradients of the approaches to the humps is brought about by the fact that the running lines are on a falling gradient at 1 in 653 from Feltham Station to the east end of the yard at Feltham Junction, the difference in levels between these latter points being 8 ft. A difficulty in introducing hump shunting in this country in yards dealing with general merchandise traffic as well as coal is the difference in the speed at which oil and grease axle-box wagons run down from the hump, the oil axle-box wagons running faster than the grease axle-box wagons, but the avoidance of long ladders should overcome this drawback.

Distance from the summit of the hump on the up sidings to the first points is only 150 ft. and to the second set of points 250 ft.; no points are further away from the hump than 570 ft. On the down side the distance to the first points is 270 ft. to the second 380 ft. and the farthest 680 ft.

There will be two all-electric signal-boxes of approximately 35 levers each, one situated near the summit of each hump. A clear view of the yard will be obtained from these boxes, and the whole of the working of wagons over the humps will be controlled therefrom. Both the up and down reception sidings will be track circuited, and these track circuits will extend as far as the clearing points in the up and down marshalling sidings.

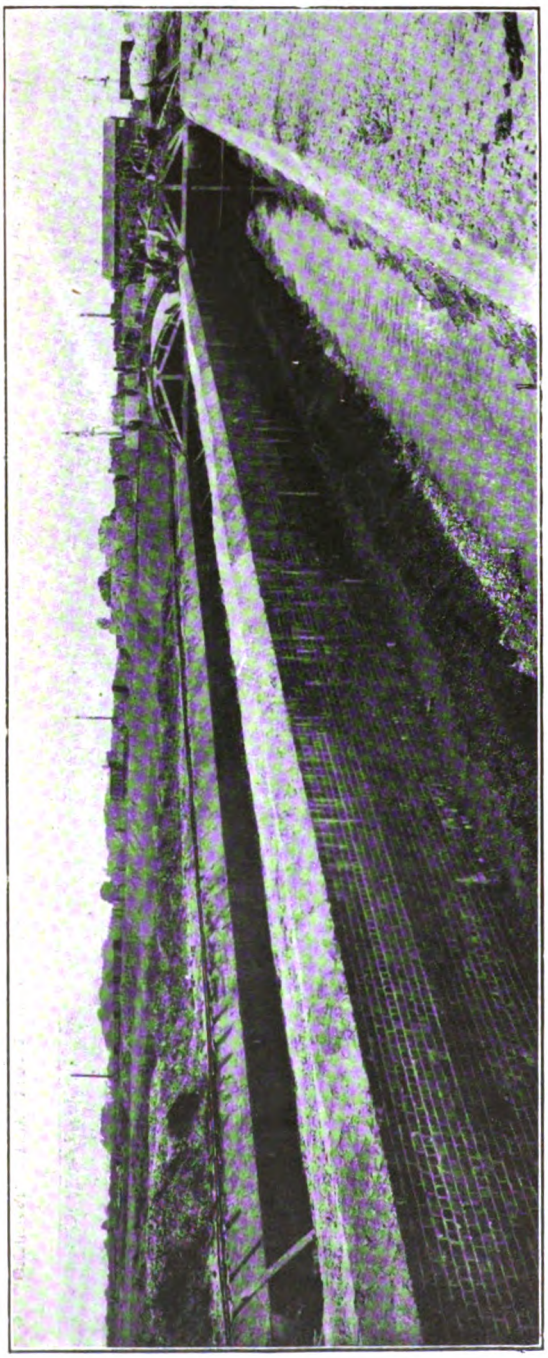
Track circuits in the up and down marshalling sidings will be divided up in such a manner as to provide a separate



GENERAL VIEW FROM WESTERN END OF YARD, SHOWING UP RECEPTION SIDINGS ALREADY COMPLETED.

Digitized by Google

track circuit for each pair of points, and they will be connected to an indicator in the hump signal-box. The presence of a wagon on any of these track circuits will cause a disc, situated near the lever, numbered to correspond with the number of the lever working the points, to be operated, thereby enabling the signalman to know exactly when he can move any pair of points. The advantage of this arrangement in darkness or during the prevalence of fog will be appreciated by the practical railwayman.



VIEW SHOWING CULVERT AND RELIEF CULVERT (FOR FLOOD OVERFLOW) INTO WHICH THE RIVER CRANE. WILL BE DIVERTED.

Movements of trains entering or leaving the yard will be controlled by Feltham Junction box at one end and by Feltham East box at the other end These boxes, of course, also control the movement of trains on the up and down main lines, and in order to accelerate traffic movement the lines between Feltham Junction and Feltham East will be track circuited, and an up outer-home signal provided at Feltham Junction and a down outer-home signal at Feltham East Trains will be signalled by bell only, the traffic being safeguarded by indicators and electric locks operated by the track circuit, instead of the usual block instruments Two track circuits will be provided, one extending from the starting signal at the box in the rear to the outer-home signal of the box in advance, and another between the outer and inner home signals. The signalman at either box will be able to allow a train to enter or leave the yard whilst a train on the main line is approaching the outer-home signal, but the presence of a train or engine on the track between the outer and inner-home signals will prevent a movement being made to or from the yard where such movement will foul the line upon which the train is approaching, or standing at, the inner-home signal. The presence of a train or engine on either of the track circuits before mentioned will, of course, hold the starting signal at the signal-box in the rear in the "danger" position.

The repair depôt for cripple wagons, as will be seen from the plan, is situated near the centre of the yard, the yard not being

Digitized by Google

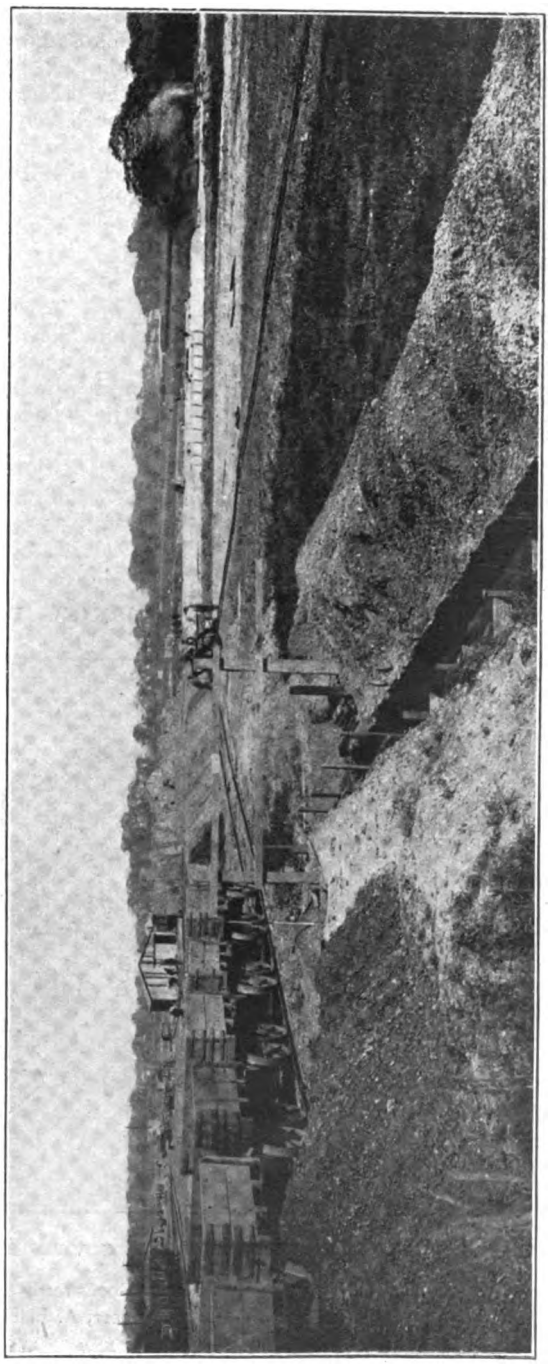
of such dimensions as to justify separate repair depôts for both up and down wagons. Other interesting features of the layout at Feltham not usually associated with a concentration yard are the provision of cattle pens and a transfer goods shed on the down side. One of the many difficulties of British railway operation is the large number of small consignments for a wide variety of destinations, and the transfer shed should prove most useful in enabling lightly-loaded wagons from northern lines to be transferred to wagons from Nine Elms, thereby giving not only a better load, but a more adequate service to a large number of minor stations in the south and west of England.

When the yard is completed, Feltham will naturally become the terminating point for the majority of the London and South Western Railway main line goods engines, and an engine shed will be built to accommodate 42 tender engines with ample room for future extension. A coal stacking ground for about 12,000 tons of coal is another feature of the layout, and the latest automatic coal apparatus will be provided, enabling a tender holding 5 tons of coal to be loaded in five minutes.

Over the building set apart for offices, mess rooms, &c., a look-out tower will be provided for the use of the yard-master, who will be in telephonic communication with various parts of the yard, and also in direct telephonic communication with all the principal stations on the system through a switchboard which is being provided at Feltham Yard. The whole yard will be electrically lighted to facilitate night working.

Comfort of the yard staff, trainmen, enginemen and guards is being well provided for. In addition to mess rooms, a hostel with sleeping accommodation will be provided for men who have to take rest at Feltham between trips, whilst for the resident staff and for drivers and guards stationed at Feltham it is intended to build a "garden city" near the east end of the yard.

With the exception of the girders in the Quaker Road Bridge at the west end of



VIEW LOOKING EAST, TAKEN FROM SUMMIT OF EARTHWORK FOR UP HUMP.

Digitized by Google

the yard, which were supplied and erected by E. C. & J. Keay, of Darlaston, no outside contractors have been employed, the whole of the works being carried out by the company's own staff. During part of the war period some 200 German prisoners were employed on some of the brickwork, concrete and earthworks, but their work was not altogether satisfactory, and this temporary expedient was discarded soon after the armistice. Culverting being now nearly finished, good progress should be made with the completion of the earthworks and the laying of the rails, which will comprise about 30 miles of single track, but what with the track circuiting, signalling and the erection of engine depôt, transfer shed and other works, it is not anticipated that the yard will be finally completed and in working order for another 18 months.

The total cost of laying out and equipping Feltham Yard, including the cost of the land, will not fall far short of £250,000.

For particulars utilised in the preparation of this article, we are indebted to Sir Herbert Walker, K.C.B., General Manager, London and South Western Railway; Mr. A. W. Szlumper, Chief Engineer (who is responsible for the design and construction of the yard); Mr. G. F. P. West, C.B.E., Superintendent of the Line, and their staffs. Mr. R. D. Hawes, New Works Assistant to the Chief Engineer, and Mr. H. C. Annett, Resident Engineer at Feltham, are in charge of the construction of the yard. Mr. W. A. Thorrowgood, Signal and Telegraph Superintendent, is responsible for the signalling and track circuiting. Mr. F. Bushrod, O.B.E., Assistant Superintendent of the Line, was Chairman of the Committee which investigated the subject of gravity yard working, preparatory to the adoption of the layout selected.

GOODS TRAIN WORKING IN NEW ZEALAND.

Photo.] NEW ZEALAND GOVERNMENT RAILWAY. [*W. Stewart.*

7.35 a.m. Mercer Goods ready to leave Auckland.
4-6-2 Engine, A584. Engineer, A. Blackwell; Fireman, C. Little.

Digitized by Google

Reconstructed Electric Cars :

METROPOLITAN RAILWAY.

IN order to alleviate the extreme congestion of the "rush" hours on the London electric railways, due, mainly, to the delays which occur at stations, special attention has been given to improvements in the design of rolling-stock with a view to rapid entrainment and detrainment of passengers, without which no traffic accelerative measures and additional trains can be permanently satisfactory.

As showing the importance of this factor, it may be mentioned that when trains are run at a rate of 30 to 40 per hour in each direction, an increase of even a few seconds in station time involves serious delay. In fact, it is estimated that if station time exceeds 25 sec., the scheduled number of trains cannot be operated, and, as it has been realised that end doors, even when supplemented by middle doors—a further difficulty is that ordinary end motor cars have one of the end doors out of use for passengers—will not suffice to meet present needs, new designs provide for additional doors and improved internal arrangements.

In the June, 1919 RAILWAY MAGAZINE a diagram was reproduced showing a scheme adopted by the Metropolitan Railway. The first train is the result of reconstruction of existing stock, carried out by the Metropolitan Carriage, Wagon and Finance Company, Limited., at their Saltley Works, but an additional 100 cars are also in hand, and, when completed, should assist materially in solving London's severe traffic problem. Meanwhile, the first train is now in service, and we have pleasure in reproducing illustrations thereof.

The special feature of the new train is the provision of five swing doors on each side of every car in place of the two or three sliding doors, with a corresponding improvement in entraining and detraining facilities. The underframes and trucks of the cars are identical with the original ones. The seating has been re-arranged, the number of seats being increased and an improved type introduced, the new trains giving a total accommodation of 292 seats against the 268 seats hitherto. The following details will be of interest :—

MOTOR CAR.

Seating capacity of—	
Car with two end doors	48
Car with additional centre door	38
New car with five swing doors	41

THIRD TRAILER CAR.

Seating capacity of—	
Car with two end doors	56
Car with additional centre door	48
New car with five swing doors	58

FIRST DRIVING TRAILER CAR.

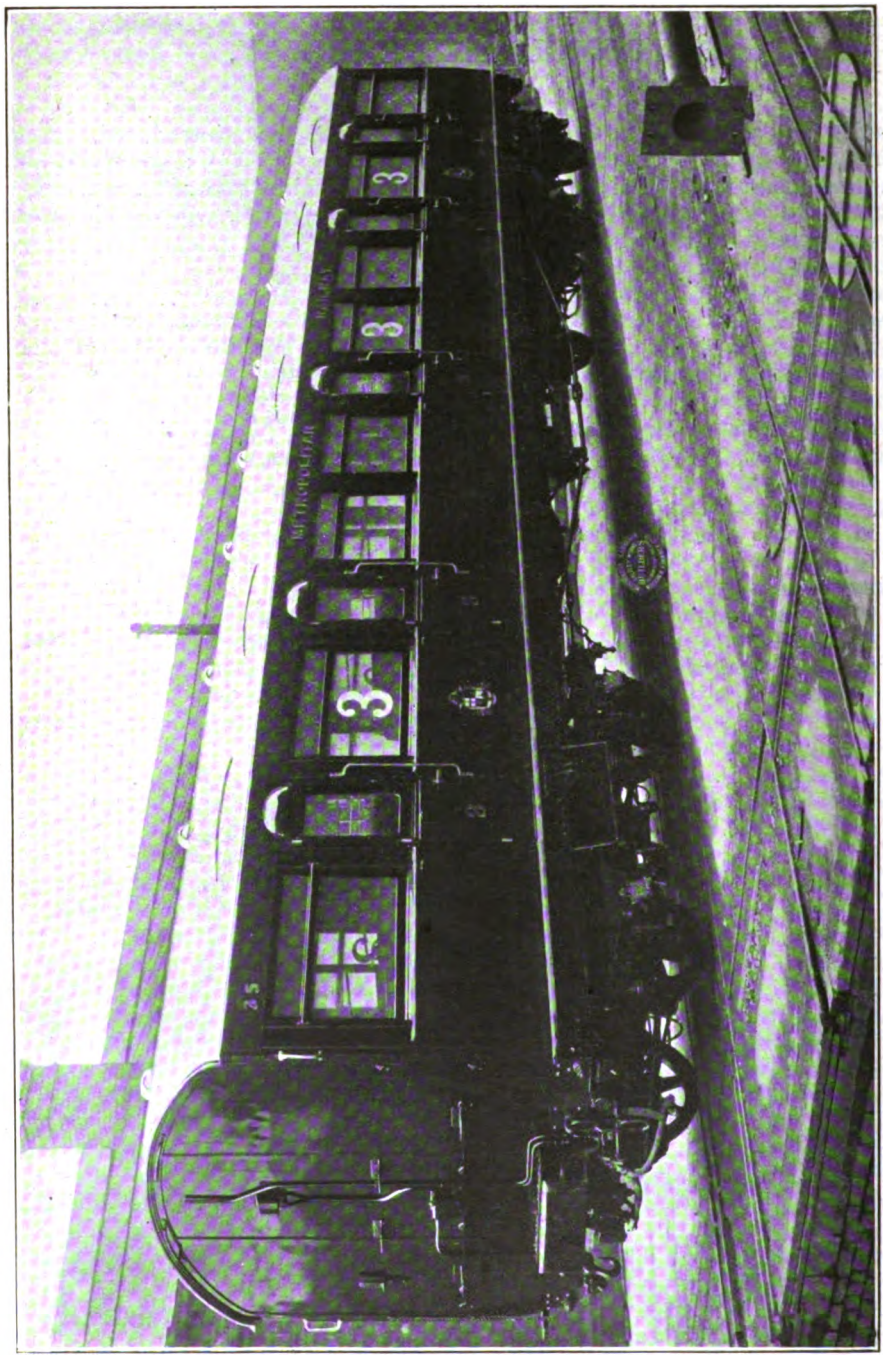
Seating capacity of—	
Car with two end doors	56
Car with additional centre door	48
New car with five swing doors	44

The new door and seating arrangements allow of improved circulation inside the cars, the great inconvenience occasioned with previous designs to seated passengers by others entering and leaving is now eliminated and all gangways are entirely unimpeded, whilst attention has also been paid to the improvement of heating and lighting and the provision of ventilation without draughts. A graceful dome roof has been provided and a "softening" of the lights obtained by the use of frosted bulbs and opal reflectors. The new system of switching enables the guard to control the lighting throughout the train, thus saving delays now inevitable due to independent car light switching.

A great point achieved in the new train is the elimination of strap-hanging. "Steadying" rails are arranged to provide a hold for passengers so that, whilst some standing is inevitable during rush hours, passengers (and especially those of short stature) will be in a normal position, and not be required to undergo the discomfort of travelling with arms outstretched upwards.

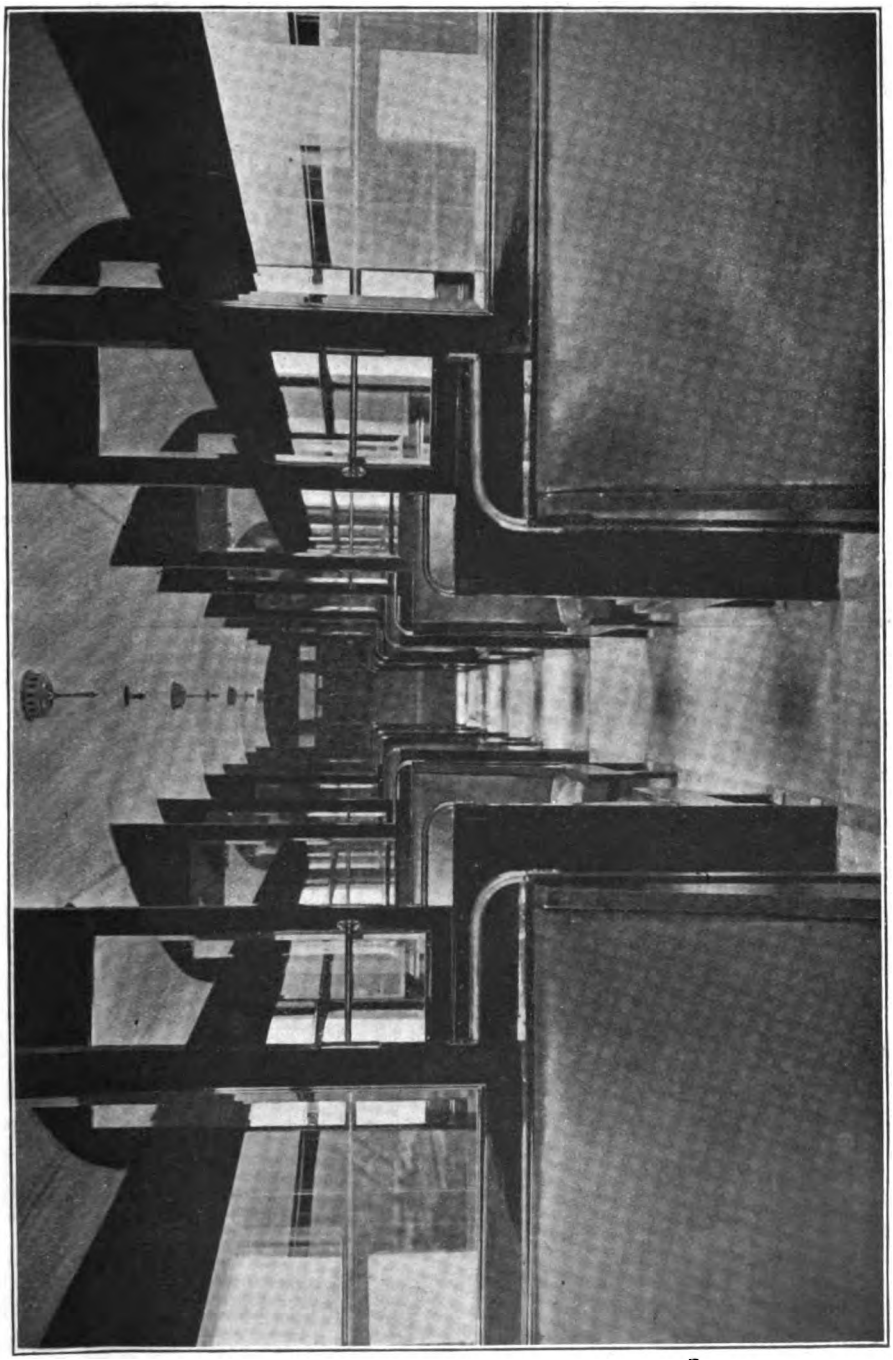
The side doors adopted are of the company's standard type as fitted to compartment stock, but by means of spring buffers and strengthening of

Digitized by Google



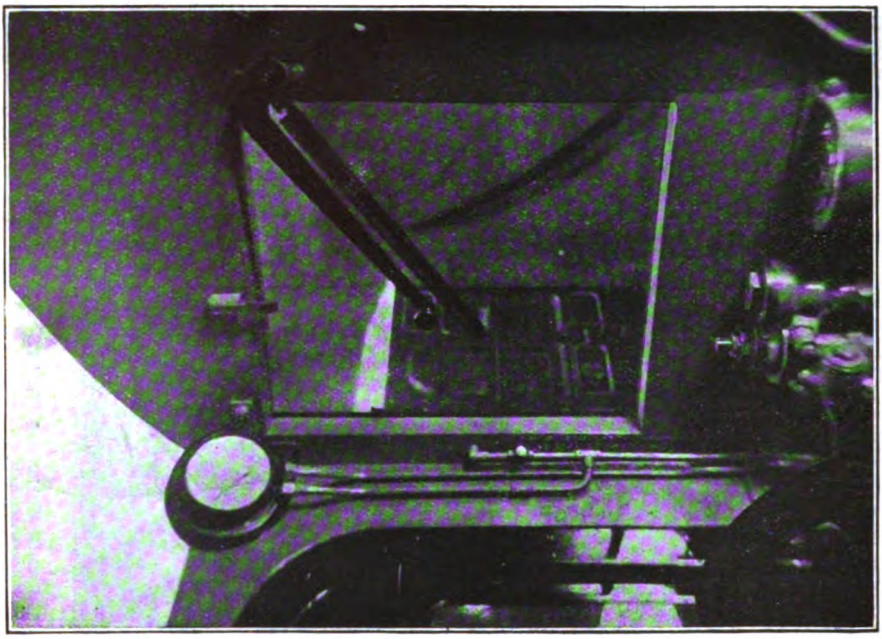
NEW THIRD-CLASS CAR WITH FIVE DOORS, METROPOLITAN RAILWAY.
BUILT BY METROPOLITAN CARRIAGE, WAGON & FINANCE COMPANY, LIMITED.

Digitized by Google

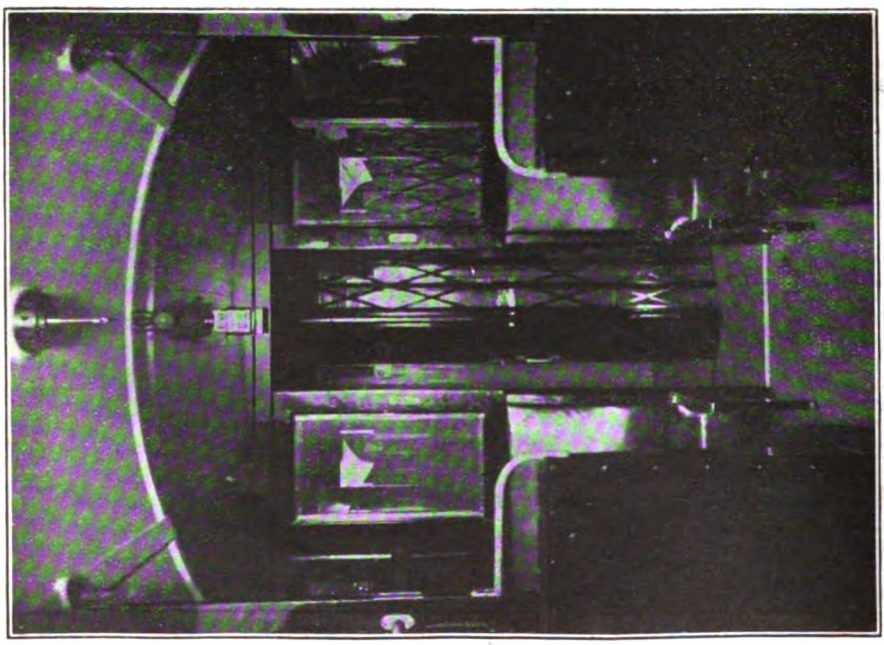


INTERIOR OF NEW METROPOLITAN RAILWAY CAR, SHOWING ARRANGEMENT OF SEATS AND "STEADYING RAILS" FOR USE OF STANDING PASSENGERS.

Digitized by Google



INTERIOR OF DRIVER'S COMPARTMENT, SHOWING AUTOMATIC WINDOW WIPER.



VIEW SHOWING LUGGAGE COMPARTMENT GUARDED BY BOSTWICK SLIDING LATTICE GATE.

[METROPOLITAN RAILWAY'S NEW ELECTRIC STOCK.]

Digitized by Google

longitudinal framing, door-controlling straps have been eliminated, as also have window straps in third-class. A new form of lock has been fitted which, whilst being very easily operated, is provided with a special safety catch, thus providing an additional safeguard.

To add to the facilities for quick entraining and detraining on the motor cars, arrangements have been made to allow passengers to use the luggage compartment doors. The actual luggage compartments are enclosed by Bostwick sliding lattice gates, which should reduce the pilfering of small articles, everything being within open view.

Although the end door has been dispensed with, special handles have been provided to enable guards to pass from one car to another in cases of emergency, whilst step-irons are fitted for safety alighting on the track when necessary.

Various improvements have also been made to safeguard the safety and convenience of the travelling public by the provision of an improved device for controlling the "trip" for actuating the brakes in emergency, and automatic window "wipers" to enable the driver always to maintain a clear view. The improved buffing and draw gear should give smoother starting and stopping of the train, whilst route number indicators of an improved type have also been embodied.

Whilst everything has been done to promote the comfort of the passenger that of the staff has not been overlooked, and comfortable, well-upholstered seats for them have been provided.

In view of the urgency of the work the train has been constructed at the works of the Metropolitan Carriage, Wagon and Finance Company in an exceptionally short time, while delivery of other trains is designed to follow in quick succession.

AN INTERESTING LOCOMOTIVE COMBINATION AT ST. PANCRAS, MIDLAND RAILWAY.

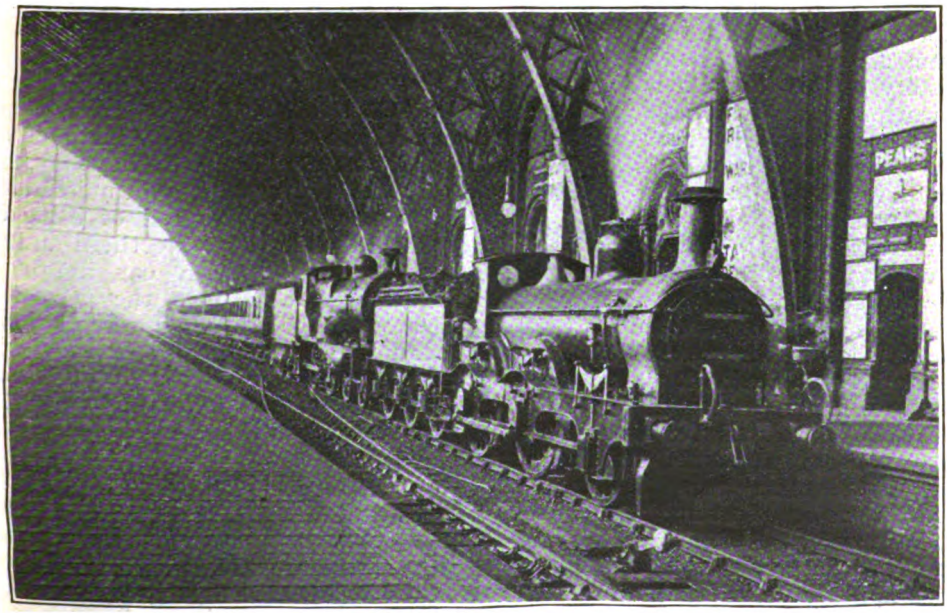


Photo.] [*C. Macartney Robbins.*

MAIN LINE TRAIN AT No. 7, ARRIVAL PLATFORM.

Pilot, old 2-4-0 locomotive; train engine, 3-cylinder compound 4-4-0 engine.

Digitized by Google

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

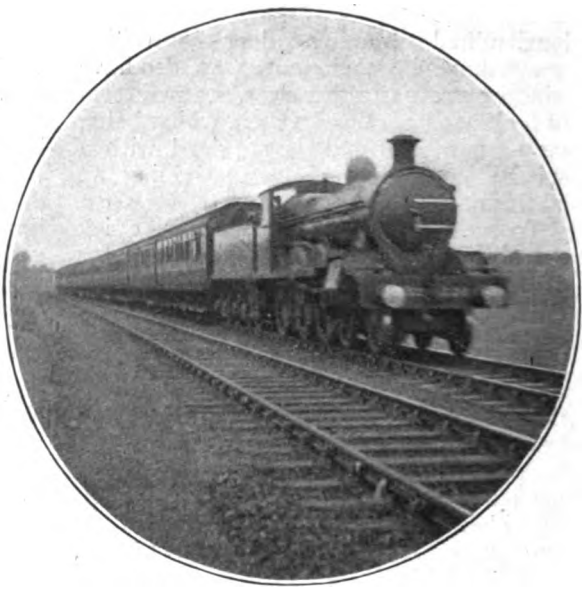


Photo.] [*K. A. C. R. Nunn.*

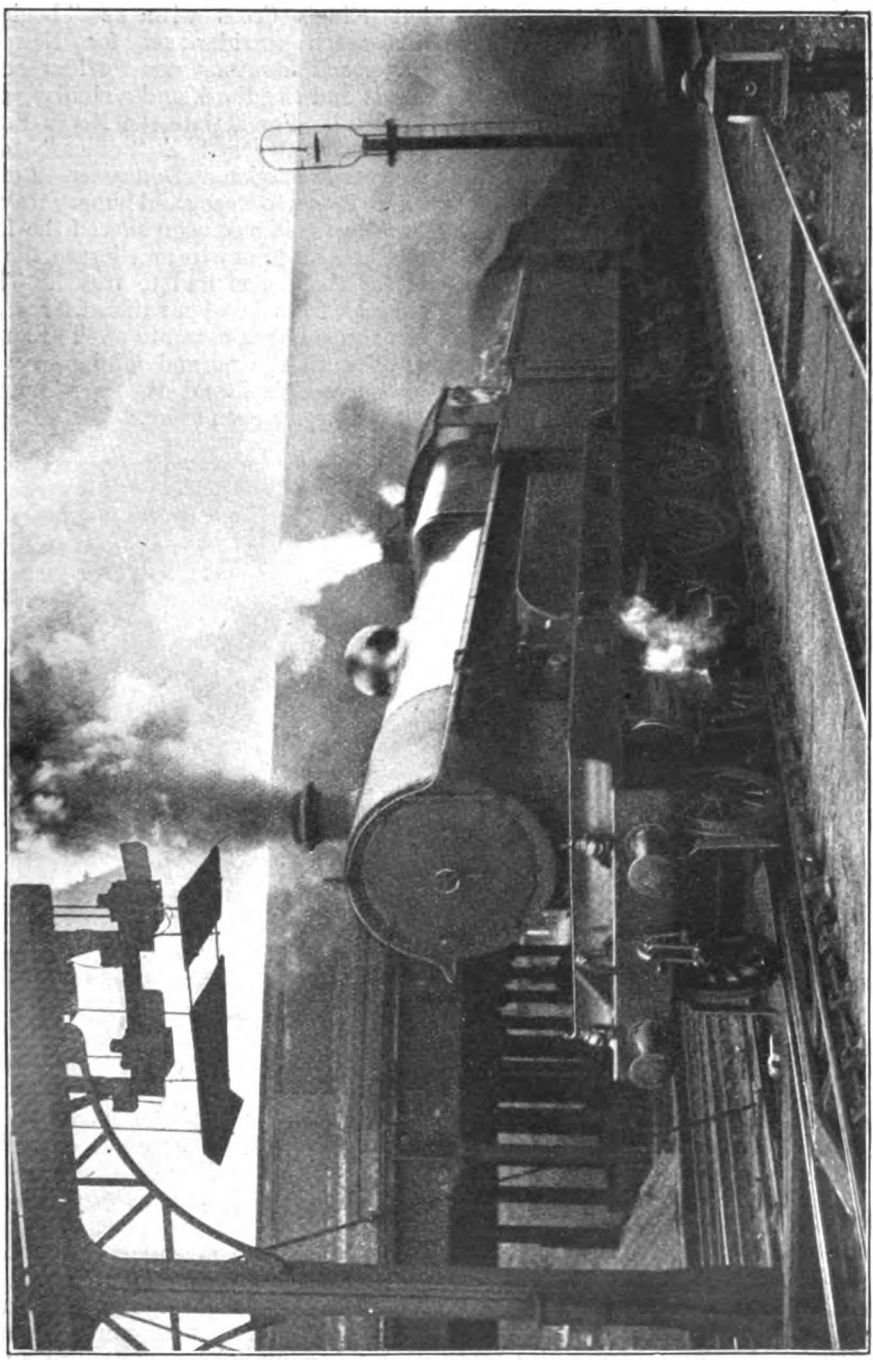
GLASGOW & SOUTH WESTERN RAILWAY.

Glasgow–London through Dining Car express approaching Carlisle. 4–6–0 superheater engine, No. 128.

ONE of the most surprising of all recent time-table changes has been the re-timing of the popular 5.30 p.m. express of the Great Northern and North Eastern Railways from King's Cross to Newcastle. The history of this train, in which, as a frequent passenger during the past 11 years, I am perhaps more than usually interested, has been one of great variety. When I first knew it, a little over 20 years ago, the 5.30 p.m. *ex* King's Cross was a dining car express to Manchester *via* Retford. Then for some time after the opening of the Great Central London extension in 1899, the train was diverted *via* Nottingham, following the Great Central route from there to Sheffield. The next step, although I cannot recall the year in which this was taken, was the addition to the 5.30 p.m. of a portion for Newcastle. About the same time the Manchester portion was cut short at Nottingham, and an independent "flier" ran to Sheffield and Manchester *via* Retford at 6.10 p.m. (subsequently 6.5 p.m.). My earliest recollections of travelling frequently by "No. 619 down" relate to 1908, and by this time the 5.30 p.m. had become a 6-coach dining car "set" for Newcastle, for the feeding arrangements on which the North Eastern Railway has always been responsible, with an independent dining car portion of three vehicles on the rear for Nottingham. If one had any objection, conscientious or otherwise, to the fare provided by the North Eastern Company in the Newcastle "diners"—which I am unable to imagine, as for excellence of catering, variety of *menu*, and courtesy of service they are, in my experience, unrivalled—the unique alternative was thus presented of being entertained by the Great Northern authorities in their Nottingham car at the rear, or *vice versa*. Before the end of 1908, however, the Nottingham portion had shrunk to one composite coach, and it was not long before this also vanished, the position as regards Nottingham and Newcastle being in this way exactly reversed. The next step was the addition of a through coach for Middlesbrough and Saltburn, detached at York, and run forward thence by special train at 9.20 p.m., following the London train, and diverging from the North Eastern Railway main line at Northallerton. This coach soon expanded into two.

Then came the war. In its early stages the Saltburn vehicles shared the fate of many other through facilities, and

Digitized by Google

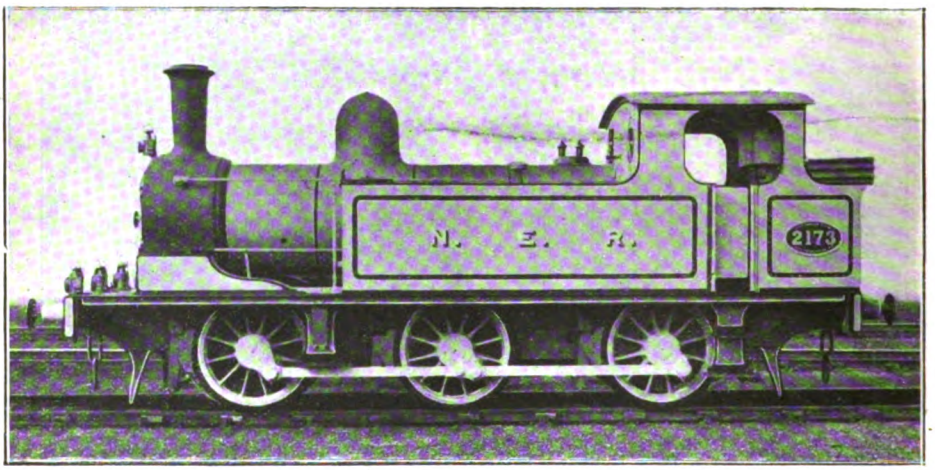


"CLAUGHTON" CLASS ENGINE, No. 1345, "JAMES BISHOP," LEAVING EUSTON WITH A 450-TON TRAIN.

Digitized by Google

were withdrawn. For some time subsequently, however, the direct connecting train from York to Saltburn was maintained, but in May, 1917, that train also vanished. Out of kindness of heart, the ingenious compilers of "Bradshaw" thought that through facilities might as well still continue to operate, *via* Darlington, and from that date until the recent restoration of the direct train from York to Middlesbrough, consistently proclaimed in their Saltburn branch table that the 10.40 p.m. from Darlington to Saltburn was a "through train from York at 9.38 p.m.," although this was the purest fiction. It would be interesting to discover the genesis of imaginative errors such as these!

to Harrogate and York. On the first night of the combination the 5.30 p.m. left King's Cross with 12 "bogies"—a 6-coach corridor set for Newcastle, a 3-coach lavatory non-corridor set for Leeds and Bradford, and a similar portion for Hull. For a time the North Eastern Company attached a "diner" to the Newcastle portion at Doncaster—a mighty solace it was to weary and hungry travellers too—but this also soon shared the fate of all such attempts to ameliorate the hard lot of those who had to travel. The 12 vehicles from London sufficed for a while, but this number began to swell at an early date, until the normal minimum was 14 or 15 vehicles, and the maximum frequently 17 or even more.



0-6-0 SHUNTING ENGINE, NORTH EASTERN RAILWAY.

Cylinders, 17 in. by 24 in.; wheels, 4 ft. 1¼ in. diam.; heating surface (tubes), 658 sq. ft.; heating surface (firebox), 73 sq. ft.; grate area, 11·3 sq, ft.; weight in working order, 38 tons 12 cwt.

The next stage in the alterations followed the withdrawal of the Great Northern Railway dining cars. As a result of this, and the consequent reduction of loads, the 5.45 p.m. down Leeds, which had already absorbed the 6.5 p.m. to Hull, was added to the 5.30 p.m. to Newcastle, the combined train being due at Doncaster at 8.30 p.m., despite the intermediate stop at Grantham. It was during this period that some of the finest locomotive work in Great Northern Railway history—so far as my observations go—was performed, especially on this train and the 1.30 p.m. down, which in its turn had swallowed up the 1.40 p.m.

On this account (and the combined up morning express from Newcastle, Leeds and Hull was of course similarly affected), it became necessary some considerable while before the date of the armistice—May, 1918—to divide the 5.30 p.m. again into two of its component parts, at 5.30 p.m. for Newcastle, and 5.40 p.m. for Leeds and Hull. To the former the non-stop Grantham-York run was restored, but the times were the easiest in its history (although it still received preferential treatment in the matter of speed), 143 min. to Grantham being an excess of 16 min. over the pre-war allowance, and 102 min. thence to York one of

Digitized by Google

8 min., total 24 min. in running, *plus* 1 min. extra at Grantham. At the same time the North Eastern Company, which for some time had been stopping the train conditionally at Northallerton, while still maintaining in the time-table the impossible allowance of 45 min. from York to Darlington, and practically unaltered times thereafter, made the Northallerton stop permanent. But the 32 min. specified from York to that point (30 miles) and 18 min. thence to Darlington (14·1 miles), were as impossible as ever with such loads, often exceeding the 500-ton mark owing to additions at York.

Subsequent to the armistice the only alterations which had been made prior to those of last December were the reinstatement of the dining cars in February, 1919—this was the first of such reinstatements on the East Coast route—and the resumption of the connecting train from York to Middlesbrough in August last. This latter was a very important improvement, as the shedding of the Tees-side complement at York left room for the customary influx of passengers from Leeds, the Lancashire and Yorkshire and Midland lines, and elsewhere, which had been accumulating since the departure of the last previous north-bound express at 6.25 p.m. Thus the necessity of adding extra vehicles was avoided, and by the cutting out of the Northallerton stop (which was thenceforward made by the Middlesbrough train), without increase of total journey time, the reasonable allowance of 52 min. remained for the non-stop journey from York to Darlington. By this time the 5.30 p.m. had settled down to a regular passenger load of 11 bogies, including the dining cars, *plus* two large brakes at the rear of the train—a total tare weight of 375 to 380 tons. But unpunctuality was, unfortunately, still rife, and the need of some permanent form of relief to this important express was evident.

So the bold scheme was conceived by the authorities of the two companies, not only of bringing up the Tees-side passengers as a special "unit" from London on a new train—the revived 6.5 p.m. down Hull express—but also of cutting out altogether, for passenger purposes, the stop at York. This arrangement entailed new mileage from London to Doncaster, shared between Middlesbrough and Hull traffic, new mileage from Doncaster to York, and new mileage from York to Newcastle in the shape of a 9.30 p.m. express, taking up the working of the previous 9.38 p.m. train. This is preceded by the London train, which runs through the centre of York Station, and stops at Clifton Junction—¼-mile

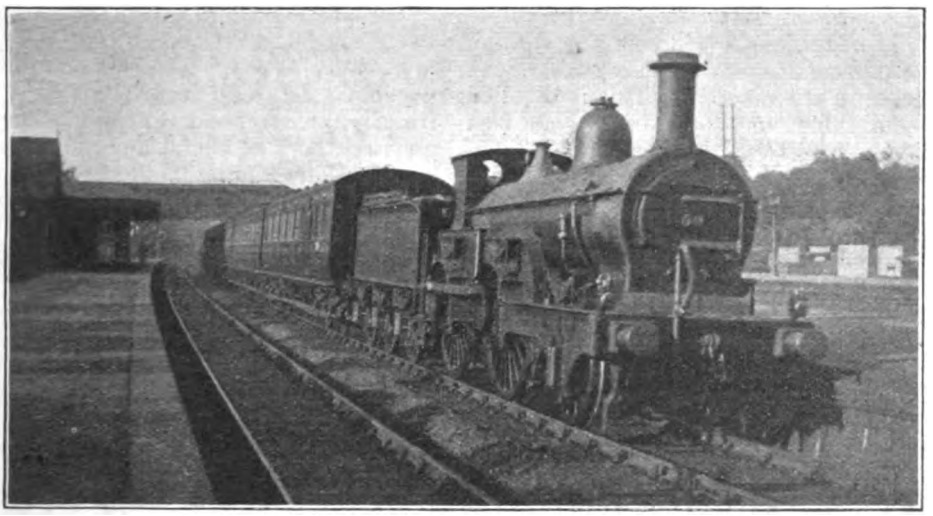


Photo.] MIDLAND RAILWAY. [*F. H. Stingemore.*

Kirtley 2-4-0 engine, No. 59, on up fast train passing Radlett.

Digitized by Google

further on—for examination and changing engines. The *venue* is not the most suitable one for the latter operation, owing to the distance which must be traversed by the engines before clearing the main line, and changing engines thereby usually takes at least 7 min., rather than the 5 min. allowed.

An examination of the train—I have travelled by it weekly since these alterations came into force—makes it appear that the measures taken have been *too* drastic, as the passenger complement has dropped to not more than one-half its previous figure, while from all accounts the 6.5 p.m. *ex* King's Cross is loading very heavily. Merely destructive criticism of the new arrangements would be valueless, however, and I will therefore outline what appears to me a more satisfactory solution of the problem. This is detailed in the table on page 108, which also furnishes a history in figures of the "No. 619 down" throughout the war period, and also of the corresponding up express.

Briefly expressed, my idea is this. The loss of both the Tees-side and the York passengers seems too serious a curtailment of the usefulness of this important express. Let us assume, therefore, that the former, who travel over 218 miles of the same route as the Newcastle passengers—as far as Northallerton—rejoin them to that point, and that York is still given the "go-by." Why, then, stop at York for any purpose at all? Why not make use of the real frontier station of Doncaster to change from the Great Northern to the North Eastern locomotive? As a natural corollary, the Grantham stop would be omitted, and the London-Doncaster stage would be run non-stop; this 3-hours' run, as an exceptional case, would probably not furnish any very serious locomotive difficulty, even in these days of 8-hour "turns." If desired, the express could probably be stopped on the centre roads at Doncaster, in order to avoid passenger complications, and the loading would thus remain constant as far as Northallerton. The latter, necessarily, would be the next stop, as here the Tees-side portion would be detached from the rear of the train, and run on to Middlesbrough, arriving there at about 10.35 p.m.—a net acceleration of 20 min., and in ample time to connect with the last train to Saltburn, which it does not do at present. In this way a train mileage of 30 would be saved—York to Northallerton—and one would imagine it an easier matter to work a Middlesbrough engine to Northallerton merely, in conjunction with a balancing Stockton-Northallerton or other "link"

Photo.] **SOUTH EASTERN & CHATHAM RAILWAY.** [*F. W. Curtis.*

Down Kent Coast Express. 4-4-0 locomotive, No. 75.

Digitized by Google

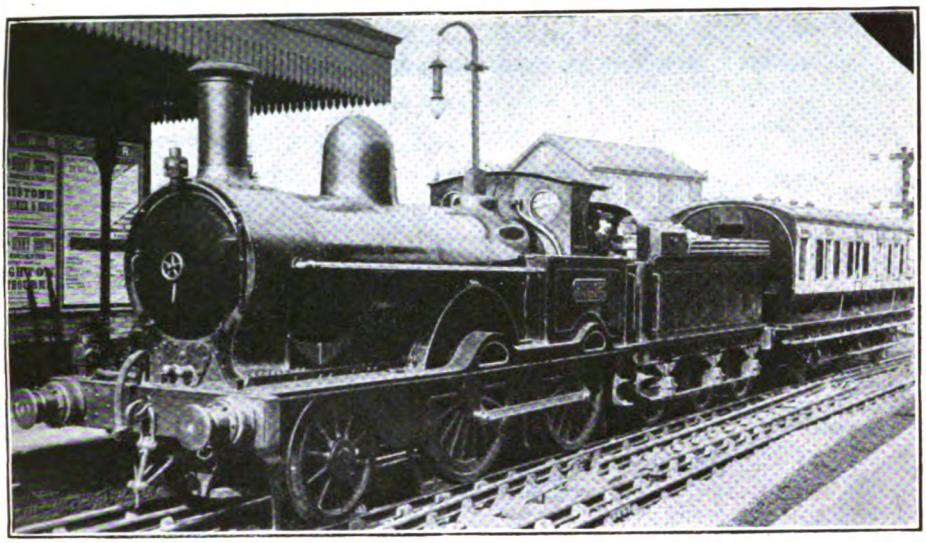


Photo.] **LONDON & NORTH WESTERN RAILWAY.** [*P. F. Cooke.*

"Engineer Manchester" at London Road, Manchester.

in this ramified district, rather than to work it down to York in the morning, leave it there from 9.22 a.m. to 10.13 p.m., and then work it back to Middlesbrough at *night*, as now. For public time-table purposes, therefore, the 5·30 p.m. *ex*-King's Cross would stop first for passenger purposes at Northallerton, 218 miles from London, and thenceforward at Darlington, Durham and Newcastle, setting down only in each case. From observations of the average loading for months past, I believe that for the greater part of the year there would be ample accommodation for this traffic in a train of 10 vehicles—third-class brake, three third-class corridors, third-class "diner" with kitchen, first-class "diner," first-class corridor and brake for Newcastle, and two composite brakes for Middlesbrough; total 42 axles, or about 300 tons tare.

But what of the intermediate passenger working? This would be met by starting the 6.5 p.m. Hull express from King's Cross at 5.40 p.m., carrying a light portion of, say, two or three vehicles for York, as well as the brake-van of Scottish traffic which at present forms the last vehicle of the 5.30 p.m. down. As the 6.5 p.m. does now, the 5.40 p.m., slightly accelerated, would call at Grantham (picking up there the 5.30's North traffic) and Doncaster; from there the York portion would run forward, as the Middlesbrough portion does at present, connecting at York with the existing 9.30 p.m. express to Newcastle, and transferring to the latter the Scotch brake. This train would require to start 8 min. later than at present, but would still be in good time to make the existing Tees-side and Sunderland connections at Darlington and Durham respectively. Finally, the Grantham stop of the 5.40 p.m. would collect there any Leeds passengers, transferring them at Doncaster, and would render unnecessary any stop of the Leeds train there; the latter might, therefore, leave at 5.50 p.m., call only at Peterborough to Doncaster, as before the war, and with practically no acceleration pick up its present times there.

As will be seen by the annexed time-table, I have not contemplated any acceleration worth mentioning in actual *running* times, in view of present difficulties, and there is therefore virtually no curtailment of end-to-end times, save between London and Tees-side. My idea is that, if it is intended to make the 5.30 p.m. a true "Limited" express for the North, this seems to me a more logical way of doing it.

But when we turn to the three corresponding south-bound trains in the morning, and plan their running in the same

Digitized by Google

GREAT NORTHERN AND NORTH EASTERN RAILWAYS.

5.30 P.M. KING'S CROSS—NEWCASTLE.

Miles.	Intermediate Stops.		1908	Aug., 1914.	June 1916.	Jan. 1917.	May 1918.	Aug. 1919.	Dec. 1919.	Suggested Timings. 5.30	6.5	5.40
			p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.
0.0	King's Cross.. ..	dep.	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.40	5.50
76.4	Peterborough ..	arr.	pass	pass	pass	pass	pass	pass	pass	pass	pass	7.22
		dep.	6.54	6.54	6.55	6.57	7.3	7.3	7.1	6.58	7.8	7.27
105.5	Grantham	arr.	7.27	7.27	7.31	7.35	7.43	7.43	7.34	pass	7.44	pass
		dep.	7.31	7.31	7.34	7.42	7.48	7.48	7.38	7.33	7.48	8.7
156.0	Doncaster	arr.	pass	pass	8.30	8.38	pass	pass	pass	8.28	8.44	9.3
		dep.	8.25	8.25	8.36	8.43	8.49	8.49	8.34	8.33	8.49	9.8
188.2	York	arr.	9.5	9.5	9.16	9.26	9.30	9.30	pass	pass	9.30	To Leeds and Bradford.
		dep.	9.13	9.13	9.24	9.34	9.38	9.38	9.15	9.16	9.38	
188.5	Clifton Junction ..	arr.	—	—	—	—	—	—	9.17	—	—	
		dep.	—	—	—	—	—	—	9.22	—	—	
218.2	Northallerton ..	arr.	pass	pass	pass	pass	10.10	pass	pass	9.50	pass	
		dep.	9.43	9.43	9.54	10.4	10.12	10.13	9.56	9.53	10.13	
232.3	Darlington	arr.	9.57	9.58	10.9	10.19	10.30	10.30	10.13	10.11	10.30	
		dep.	10.0	10.1	10.12	10.24	10.35	10.35	10.18	10.16	10.35	
254.3	Durham	arr.	10.25	10.27	10.38	10.50	11.1	11.1	10.47	10.45	11.4	
		dep.	10.28	10.30	10.41	10.54	11.5	11.5	10.50	10.48	11.8	
268.7	Newcastle	arr.	10.47	10.50	11.1	11.14	11.25	11.25	11.12	11.10	11.30	

7.50 A.M. (PRE-WAR 8.0 A.M.) NEWCASTLE—KING'S CROSS.

Miles.	Intermediate Stops.		1908	Aug. 1914.	June 1916.	Jan. 1917.	May 1917.	May 1918.	May 1919.	Dec. 1919.	Suggested Timings 7.50	Leeds.	7.42
			a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.
0.0	Newcastle ..	dep.	8.0	8.0	8.0	8.0	8.0	7.50	7.50	7.50	7.45	From Bradford and Leeds.	7.55
14.4	Durham ..	arr.	8.20	8.20	8.20	8.20	8.20	8.13	8.13	8.13	8.8		8.18
		dep.	8.22	8.22	8.22	8.22	8.22	8.15	8.15	8.15	8.10		8.20
36.4	Darlington ..	arr.	8.48	8.48	8.48	8.48	8.48	8.44	8.44	8.44	8.38		8.49
		dep.	8.51	8.51	8.51	8.51	8.51	8.48	8.48	8.48	8.42		8.53
50.5	Northallerton ..	arr.	pass	pass	pass	pass	9.8	9.5	9.5	9.5	8.59		9.11
		dep.	9.6	9.6	9.6	9.6	9.10	9.11	9.11	9.9	9.4		9.14
80.2	Clifton Junction	arr.	—	—	—	—	—	—	—	9.42	—		—
		dep.	—	—	—	—	—	—	—	9.50	—		—
80.5	York	arr.	9.38	9.38	9.38	9.38	9.45	9.45	9.45	pass	pass		9.48
		dep.	9.50	9.47	9.47	9.47	9.54	9.54	9.54	9.52	9.38		10.2
112.7	Doncaster ..	arr.	10.36	pass	10.30	10.31	10.38	10.39	10.39	pass	10.19	10.28	10.45
		dep.	10.40	10.28	10.34	10.36	10.43	10.44	10.44	10.42	10.24	10.33	10.50
130.1	Retford ..	arr.	pass	pass	pass	pass	pass	pass	pass	pass	pass	Pass	11.12
		dep.	11.1	10.47	10.56	10.58	11.5	11.7	11.7	11.7	10.46	10.55	11.13
163.2	Grantham ..	arr.	pass	11.26	11.36	11.40	11.47	pass	pass	pass	pass	Pass	11.57
		dep.	11.40	11.30	11.38	11.44	11.51	11.51	11.51	11.51	11.27	11.36	12.2
192.3	Peterborough	arr.	pass	pass	12.11	12.18	12.25	12.28	12.27	12.27	pass	12.9	12.37
		dep.	12.12	12.2	12.20	12.27	12.34	12.37	12.36	12.36	11.59	12.14	12.42
268.7	King's Cross ..	arr.	1.40	1.30	1.45	2.0	2.7	2.15	2.10	2.10	1.30	1.45	2.15

Digitized by Google

way, the advantages to be gained, again generally on the basis of current running times, are very extensive. The history of these expresses during the war period has been very similar to that of the complementary down night trains, with this exception, that for a considerable time past a relief express has left Newcastle for York in advance of the London train, at 7.42 a.m., running *via* Leamside (and thus avoiding Durham) to Darlington, which is the only stop. Consequently, in the recent changes, in order to convey passengers from Sunderland and Durham, and also from Northallerton and the Hawes branch, into York, it has been necessary to arrange a two- or three-coach York portion at the front of the 7.50 a.m. London express from Newcastle, running this with the North Eastern locomotive into York station, while the main train stands at Clifton Junction attaching its Great Northern engine for the next stop, at Peterborough. And then, as I mentioned last month, the progress is a funereal one, as the 9.35 a.m. from Leeds to London, which is stopping at Doncaster, Retford and Grantham, and on Wednesdays at Newark as well, is immediately in front of the Newcastle train. On the very day of writing we were approaching Doncaster, seven minutes early, caught the Leeds train up here, were stopped, or practically so, outside Doncaster, Retford, Grantham, on the ascent to Stoke, and outside as well as at Peterborough, finally arriving in London five minutes late, at our worst pre-war time of 2.15 p.m. The Newcastle express, with one coach less than the 5.30 p.m. down, and only one stop more, is thus booked to take 38 min. longer between Newcastle and London than the down train, not having been accelerated at all, saving only by 5 min. south of Peterborough in May, 1919. Tees-side passengers have been the only ones to benefit by the recent alterations, gaining as they have done 35 min. by running through to Doncaster to join the up Hull express.

My proposals would, in the first place, involve starting the London express at 7.45 a.m. from Newcastle, *in front* of the relief. This would be necessary in order that passengers from Tees-side for York, and the important south and west connections at York about 10 a.m., might have the relief to change into at Northallerton after the London train had left. The latter would call at Durham, Darlington and Northallerton to pick up London passengers only, and at the last-mentioned station would attach the Middlesbrough portion, which would have left Middlesbrough about 8.20 a.m., instead of 8 a.m., as now. As before, Doncaster would be the only stop south of Northallerton, on the up centre road if possible,

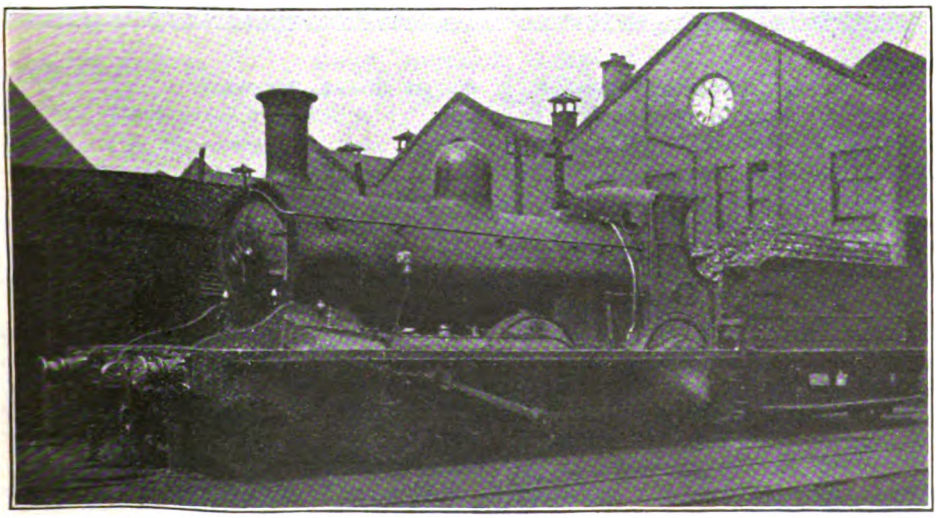


Photo.] **CALEDONIAN RAILWAY.** [*W. H. Whitworth.*

Old 4-4-0 passenger engine, No. 1182, "Oban bogie" type.

Digitized by Google

in order to exchange the North Eastern for the Great Northern locomotive, and for examination. A non-stop run thence to King's Cross—such as obtained years ago, when I first travelled by this train—would bring the express into London at its pre-war hour of 1.30 p.m., 40 min. earlier than at present, with a 5 min. earlier start from Newcastle, and one 20 min. later from Tees-side, but a net gain of only 25 min. in the latter case. I am pre-supposing that the next south-bound train from Doncaster would be the up Leeds express, slightly "eased" in times to Doncaster, which is at present needful. Should the Newcastle train be running a little late, if it were standing on the centre road, the Leeds train would be able to run to the platform without delay. The Leeds express would then revert to its pre-war Doncaster–Peterborough non-stop run, and reach London at 1.45 p.m., 10 min. earlier than now, and in 4 hours 10 min. from Leeds, as in the case of the altered down evening express.

But what about its intermediate calls, and also our poor York–London passengers, whom we have left apparently stranded? The Newcastle–York relief, leaving Newcastle at 7.55 a.m., after the London train, would call at Durham, Darlington and Northallerton, and reach York in time to make all the existing York connections, including one at 10.2 a.m. from York to Doncaster. This would consist of the through vehicles worked down on the 5.40 p.m. the previous night, and would be attached at Doncaster to the 9.10 a.m. from Hull, which would start 35 min. later. It would be this combined train—relatively less important than either the Newcastle or the Leeds expresses—that would make the Retford, Newark (when required) and Grantham calls, and even in so doing Hull passengers would only lose 5 min. to London. Now the advantage of this arrangement is obvious. The non-stop express would leave Doncaster first; the train immediately following would have one stop, and the next train three (four on Wednesdays). This is the correct order for time-keeping. Further than that, passengers from North-East coast stations for Retford, Grantham and Peterborough would take the Newcastle relief to York and change there into the new 10.2 a.m. train; passengers from the West Riding for Retford and Grantham would change into the same train at Doncaster.

Amateur time-table compilers, however fascinating they may find the occupation,

Photo.]. [*P. S. A. Berridge.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY.

Willesden–Three Bridges goods train passing Purley Oaks. L. & N.W.R. 0–8–0 locomotive, No. 1823.

Digitized by Google

of necessity labour under the distinct disadvantage of being unacquainted with *all* the circumstances governing the schedules which are finally settled by the authorities. Consequently I am quite prepared to believe that my scheme may be open to damaging criticism on grounds of which I am at present unaware, but at the same time I believe it to be practical and workable. Beyond constant use of, and intimate acquaintance with, the trains concerned, however, the recent alterations have been of particular interest to me as a possible first step in the direction of the "Limited" expresses which were outlined in such detail in these articles in the early part of last year. This must be my excuse for devoting so much space to so circumscribed a subject. And now, in turning to performance, I can hardly do better than detail a few recent trips on the 5.30 p.m. *ex.* King's Cross, made subsequently to the December alterations.

The bane of "No. 619 down" is the 4.15 p.m. down York "slow," which it is supposed to pass at Grantham, together with the 5.0 p.m. down to Stamford, which it should follow past Essendine. There is a nominal margin of 8 min. at Grantham in the former case and about 5 at Essendine in the latter. But even these meagre margins are only secured at a cost of almost impossible working times for the 5.30 p.m. itself, *e.g.*, the previous 73 min. allowance from London to Huntingdon, 18 min. for the 17·5 miles thence to Peterborough, and 33 min. thence to Grantham—29·1 miles, inclusive of the 20-mile ascent to Stoke. It is now at last permissible for the 4.15 p.m.—which is a train of chronically unpunctual habits—to be shunted for the 5.30 p.m., but the former is generally of such a length as to make this desirable expedient impossible. Further than that, the 4.15 often delays the 5.0 p.m., and that in its turn delays the 5.30, while the 5.0 p.m., especially on the nights when it calls at Abbot's Ripton, or when the 5.30 driver is running a little before time in order to add something to his impracticable allowance beyond Peterborough, does a little of the delaying business on its own account. Until some radical alteration is made to these two trains, it will be practically impossible for "No. 619" to run with any reliable punctuality, and every recent run of mine has been thus delayed, save one on which we had been running very badly from London.

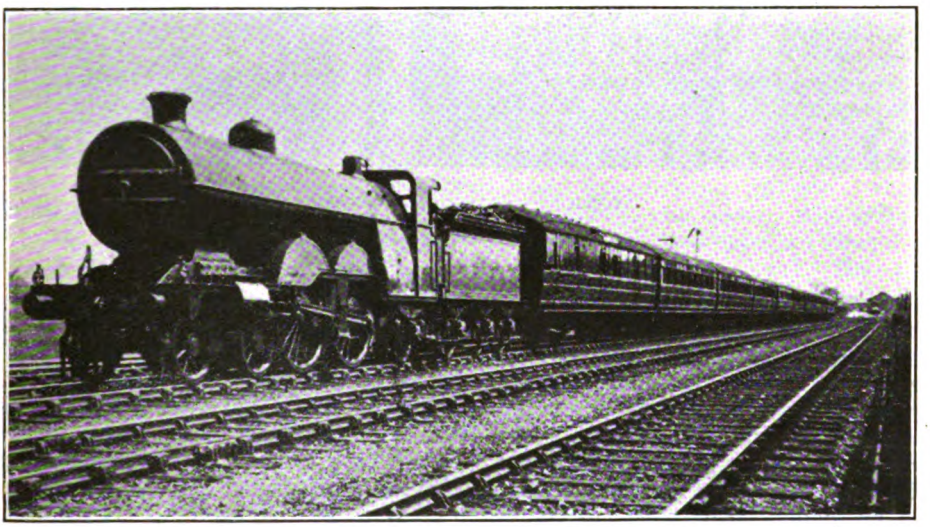


Photo.] **GREAT NORTHERN RAILWAY.** [*F. W. Curtis.*

Down Restaurant Car Express. 4-4-2 locomotive, No. 275.

On the first night (December 1st) of the accelerations, we had out of London No. 1405, superheater, with a 48-axle load weighing 322 tons empty, and 335 tons full. Starting well up the 1 in 105-

Digitized by Google

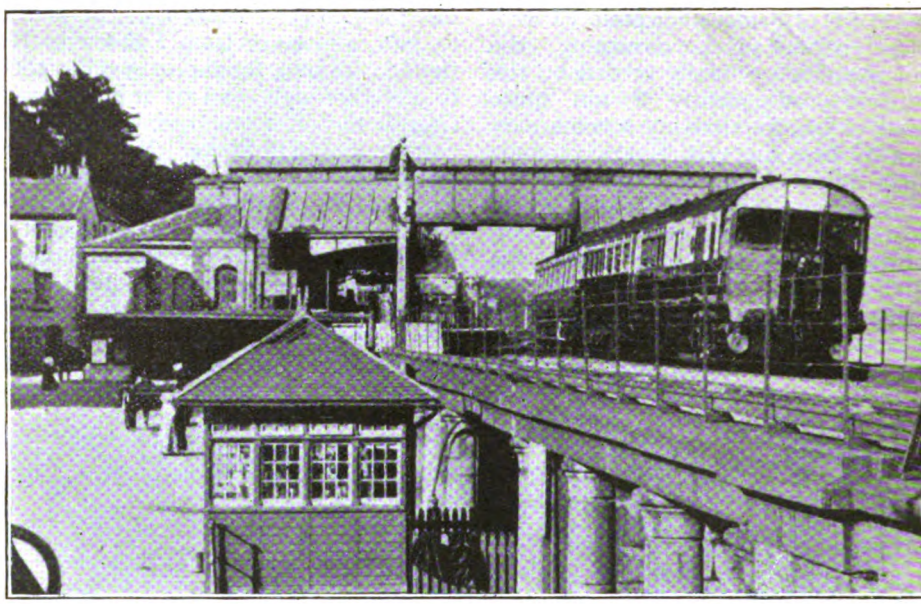


Photo.] GREAT WESTERN RAILWAY. [*E. A. Gurney-Smith.*

Rail motor leaving Dawlish.

110 to Holloway, we passed Finsbury Park, 2·5 miles, in 7 min. 25 sec.; Potter's Bar, 12.7 miles, in 23 min., at 35 m.p.h. (after 8 miles up at 1 in 200); Hatfield, 17·7 miles, in 28¾ min., at 69 m.p.h.; Knebworth, 25 miles, in 37 min. 5 sec.; Hitchin, 31·9 miles, in 44 min. 5 sec.; Sandy, 44·1 miles, in 55 min. 10 sec.; and Huntingdon, 58·9 miles, in 69 min. 20 sec., 2¾ min. early, despite the most moderate downhill speed, not exceeding 70½ m.p.h. beyond Hitchin. From Huntingdon to Peterborough we suffered severe checks from the 5 p.m. down, costing over 9 min., and took 96 min. 25 sec. to the latter place. But on to Grantham we did well, touching 58½ m.p.h. at Tallington, maintaining 52 m.p.h. past Essendine and 50 past Bytham, and not going below 41½ at Stoke Summit. So Peterborough to Essendine took 14 min, 40 sec. (12·2 miles); thence up to Stoke 14¾ min. (11·5 miles); and the final 5·4 downhill miles to Grantham, on which we touched 69 m.p.h., 5 min. 55 sec.—total, 35 min. 20 sec. from Grantham and 131¾ min. from London. Net time I should put at about 123 min., or 1 min. under schedule. A week later we had No. 1431, and made a very poor run with the same load, taking 96¼ min. unchecked to Peterborough and 139 min. 50 sec. to Grantham—nearly 16 min. loss.

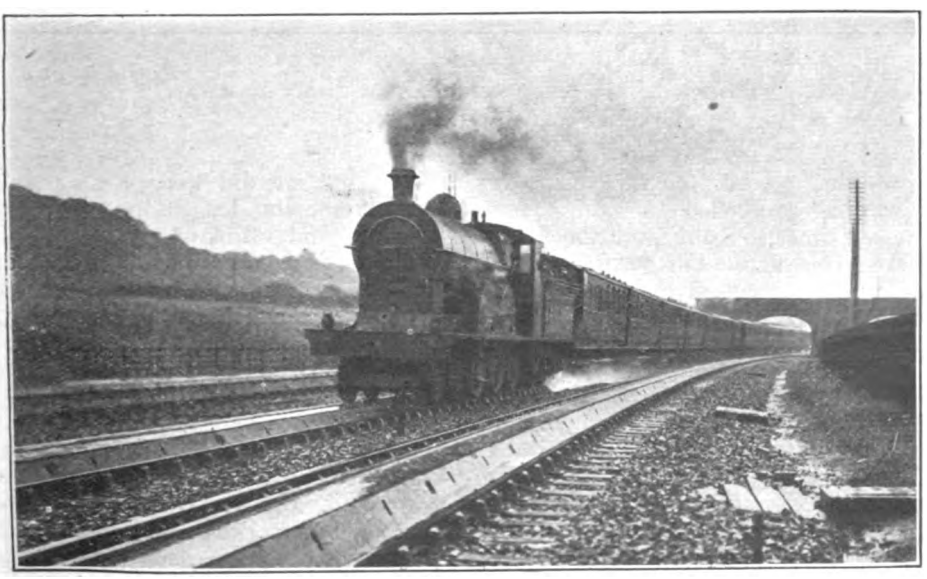
Next week No. 282, superheater, was the engine, again with a 335-ton train. A splendid start was made—Finsbury Park in 7 min. 25 sec.; Potter's Bar in 20 min. 40 sec., at 42½ m.p.h.; Hatfield, in 27 min., at 68 m.p.h.; Knebworth in 35¼ min.; and Hitchin in 42¼ min. Thence to Huntingdon we took things easily, not exceeding 72½ m.p.h. at Three Counties; Sandy was passed in 53 min. 50 sec. and Huntingdon in 68 min. 55 sec. But then we essayed to keep the Huntingdon–Peterborough sectional time, only falling to 46½ m.p.h. on Stukeley Bank, and touching 75 m.p.h. before Holme; thus we were through the Cathedral town in 87 min. 5 sec., 4 min. early. Here we passed the 5 p.m. down, but trouble was in store for us ahead by reason of the 4.15, although the delays did not begin till after Essendine, and were not serious until we were approaching Grantham. Peterborough to Essendine took 15¼ min., Essendine to Stoke 15 min. 25 sec. (minimum 39 m.p.h.) and Stoke to Grantham 7 min. 10 sec.—total 124 min. 55 sec. from London, or again 123 min. net.

Digitized by Google

This is the nearest approach to exact timekeeping I have recorded, on the accelerated timing.

The fourth week No. 1457, superheated, had an increased load of 52 axles, owing to Christmas traffic, and we left with a full 365 tons behind the tender, the tare load being 344 tons. It was a very wet and windy night, and although we got through Finsbury Park in the good time of 7 min. 35 sec., we took 24 min. 10 sec. to Potter's Bar and 34 min. 20 sec. to Hatfield, owing to falling to 34½ m.p.h. on the ascent, and then suffering a p.w.r. check near the summit. We were through Hitchin, however, in 45 min. 5 sec.—on time—and thereafter did some fine running, sustaining 80½ m.p.h. past Three Counties—my first G.N.R. "80" since the war—71½ beyond Arlesey, 75 at Biggleswade, 68 at Sandy, 57½ at St. Neot's and 66 at Offord. The 12·2 miles from Hitchin to Sandy had been run in 10 min. exactly, and the 11·9 miles thence to Offord in 11 min. 25 sec., when once again we ran into the signals of that wretched 5 p.m. down—otherwise we should have covered the 27 miles from Hitchin to Huntingdon in 24 min., thereby gaining 4 min. clear on our schedule. At Peterborough, breasted in 93 min. (87 min. net), we passed the offending train, and picking up excellently, had passed Tallington, 8·4 miles further on, in another 11 min., at 61 m.p.h., when we caught up the 4.15! Our ultimate loss was 10½ min., but unchecked we should probably have done the journey in 123 min.

My last trip was on the Monday after Christmas, and with a load worthy of the occasion, totalling 15 bogies, some non-corridor and all packed. Superheated 4-4-2 No. 1418 was the engine, the empty tonnage behind the tender being 431, and the gross weight at least 475 tons. Weather conditions were again bad, the rails being greasy, and though I well know the driver as a very capable man, they proved nearly too much for him, as we took 12¾ min. to get through Finsbury Park, 31¼ min. to Potter's Bar (passed at 31 m.p.h.), and 37 min. 5 sec. to Hatfield. But from there he made a gallant effort, touching 69 m.p.h., only falling to 49½ at Woolmer Green, and sustaining 79 for a long way beyond Hitchin, which was passed in 51 min. 40 sec. All to no purpose, however, as this time we caught up the 5 p.m. at Biggleswade! The 4.15 was evidently the source of the trouble, as we passed *both* these trains at Peterborough, at 7.20 p.m., the latter already ¾-hour late. After that we ran on to Essendine in 15 min. 35 sec., from there



LANCASHIRE AND YORKSHIRE RAILWAY.

Manchester to Blackpool Express passing over the water troughs at Lostock Junction.

Digitized by Google

to Stoke in 16 min. 56 sec., and from Stoke to Grantham in 6 min. 40 sec.—all excellent times with such a load—but arrived there 25 min. late. A summary of the best times on these four trips gives a total of 27 min. to Hatfield, 35 min. 5 sec. to Knebworth, 41 min. 40 sec. to Hitchin, 51 min. 40 sec. to Sandy, 65¾ min. to Huntingdon, 5 sec. under 84 min. (the pre-war schedule) to Peterborough, 98 min. 25 sec. to Essendine, 113 min. 5 sec. to Stoke, and 119 min. to Grantham. Something very like old times!

But still more so was the running north of Grantham. In fact, on the first night, with 335 tons, No. 1456—which holds my pre-war "record" on this train over this section—proceeded to gain 5 min. on the *new* times to Selby, and would have increased this figure but for subsequent thick fog. We touched 75 m.p.h. before Newark, covering the 14·6 miles to that point in 15 min. 55 sec., and the 21·9 miles to Crow Park in 22½ min.—all but "even time"—but the minimum rate of 40 m.p.h. at Markham Box (28·2 miles, 30 min. 5 sec.) was by comparison not quite so good. Retford, 33·1 miles, was passed in 35½ min., at slightly reduced speed,; Bawtry, 42·2 miles, in 44 min. 35 sec. after a top speed of 65 m.p.h. at Scrooby; and then, after a minimum of 50 m.p.h. at Piper's Wood, and a maximum of 67 beyond Rossington, we were through Doncaster, 50·5 miles, in 53 min. 5 sec. The fairly level 18·4 miles from Doncaster to Selby were run in 21 min. (we had slacked to 50 m.p.h. at the former, and slowed badly to 25 m.p.h. through the latter place), after which came the fog, and many checks. But our 74 min. 5 sec. time to Selby (68·9 miles) was even 2 min. below the pre-war schedule figure.

The next week our progress was comparatively leisurely, behind No. 1454, as we took 17 min. 25 sec. to Newark, 33 min. 10 sec. to Markham, 38¼ min. to Retford, and 56 min. 50 sec. to Doncaster, but we did well to compass the Doncaster–Selby length in 5 sec. under 20 min., and ultimately reached Clifton Junction, after a bad signal check before York, in 99¼ min., or 97 min. net. This would be equivalent to about 96 min. to York Station. No. 1455 got an unchecked run on the third occasion, and took 97 min. 35 sec., but its only noteworthy feature was a maximum of 77½ m.p.h. at Claypole, the 17·7 miles from Barkstone to Crow Park being covered in 15 min. 25 sec. Newark was passed in 16½ min., Markham in 31½ min., Retford in 37 min., Doncaster 55¾ min., and Selby in 77 min. 25 sec.

On the fourth run No. 1436, superheated,

Photo.] [*E. A. Gurney-Smith.*

CAMPBELTOWN AND MACHRIHANISH LIGHT RAILWAY.

Engine "Argyll" on train at Machrihanish.

Digitized by Google

did splendidly with the 365-ton train. Touching 74 m.p.h. on Claypole bank, we were through Newark in 16 min. 20 sec., and Crow Park in 23 min. 5 sec.; at Markham we did not fall below 43½ m.p.h., and, although "easing" on the descent to Retford, were through that place in 36 min. 10 sec., and Doncaster in 54 min. 40 sec. Excellent running ensued, taking us to Selby in 74 min. 40 sec., or more than 4¼ min. under schedule. Unfortunately we got signals on outside York again, but even so completed the run to Clifton Junction in 96¼ min., or 2¾ min. inside time. Net time was 94¾ min., or to York Station (equivalent time) about 93¾ min. With the 470-ton train No. 1420, another superheater, did gallantly, although overloaded on such a schedule. Still, I believe we might nearly have kept time but for a cruel signal check at Lincoln Road Box (Tuxford), where we stood for three solid minutes. We had passed Newark in 18 min. 50 sec., and subsequently ran from Retford to Doncaster in 19 min. 25 sec., and Doncaster to Selby in 22¾ min., but were badly checked after that. Still, this was good running with so tremendous a train.

The time analysis over this section shows still finer results. It works out at 15 min. 25 sec. to Newark, 22 min. to Crow Park, 29 min. 10 sec. to Markham, 34 min. 25 sec. to Retford, 43½ min. to Bawtry, 52 min. to Doncaster, 56¼ min. to Shaftholme Junction, 71½ min. to Selby, where a slack to 30 m.p.h. is covered, and 86½ min. to Chaloner Whin Junction, York. This is equivalent to an unchecked time of 90 min. to a stop at York Station (one minute under the *best* pre-war booking), or about 91 min.—8 minutes under the present schedule—to Clifton Junction. So things are materially improving on this route, at any rate.

North of York the runs were all very similar except on the fourth occasion, when our engine partially failed *en route*, and although pluckily continuing to Darlington, took 61½ min. on the journey. On the other trips Nos. 2206, 718 and 2205 each took 335-ton trains, while the 470-ton load was tackled jointly by No. 727 and the "Uniflow" 4-4-2, No. 2212. All the other engines are of the standard 3-cylinder superheater "Atlantic" type, Class Z. The times made were: to Beningbrough, 5·2 miles, 9 min., 8 min. 45, 50 and 30 sec.; to Alne, 10·9 miles, 14 min. 55 and 40 sec., 15 min. and 14 min. 25 sec.; to Pilmoor, 15·8 miles, 20 min. 10 sec., 19 min. 35 sec., 20 min. 5 sec. and 19 min. 25 sec.; to Thirsk, 21·9 miles, 26 min. 35 sec., 25 min. 35 sec., 26 min. 40 sec. and 25 min. 35 sec.; to Northallerton, 29·8 miles, 34 min. 40 sec., 33½ min., 34¾ min. and 33¾ min.; to Eryholme, 38·6 miles, 43 min. 50 sec., 42 min. 35 sec., 43 min. 25 and 10 sec.

On the first trip No. 2206, which had been running in a thick fog throughout (showing the tremendous value in such conditions of the North Eastern Railway cab-signalling arrangements), was badly checked beyond Croft Spa, but I put the net time at 50½ min. No. 718, which made the best run, reached 60 m.p.h. at Alne, 65 at Thirsk, and 64½ at Croft, not falling below 56⅓ at Northallerton and 57½ at Eryholme; with a slow finish the 43·8 miles' run was completed in this case in 49 min. 20 sec., nearly 1¾ min. under schedule. No. 2205 ran rather poorly to Northallerton, but after that touched 64½ m.p.h. at Danby and only fell to 59 at Eryholme; with this fast ending the total time was 49½ min. Once speed was attained, the double-headed train maintained it throughout between the very narrow limits of 57½ and 62½ m.p.h.—a rather remarkable feat—and finished in 49 min. 25 sec. Schedule time is 51 min., and it should be added that the road, although comparatively level, is very gradually against the engine all the way. So closely corresponding was the running on the three unpiloted trips that an analysis merely shows a minimum of 48¼ min. from York to Darlington, by taking No. 718's time to Northallerton and No. 2205's thereafter. I had hoped to describe further Great Northern and North Eastern locomotive work, of which I have an extensive collection of recent records, in this issue, but considerations of space compel me to hold these over for a future issue.

Digitized by Google

The Railway Traffic Problem.

A discussion on the Methods of Goods Traffic Working, the question of Congestion and the Schemes developed to improve the situation.

By CHARLES TRAVIS.

THE New Year messages which many of our great industrial leaders sent to the daily papers were generally unanimous in expecting a great boom in trade in 1920. It is devoutly to be hoped these expectations will be realised, and present indications point in that direction. More than ever in the history of this country is it essential that exports should be increased, production augmented and improved methods in every direction be adopted in the endeavour to bring about an equilibrium.

The year that has gone, expected to be celebrated as the dawn of the "New World," pregnant with promise for all, has been singularly disappointing. Prices generally were maintained at the war level, except in those cases where there was an upward tendency; industry was hampered by strikes and ca'canny methods of working; Government ineptitude was responsible for much unrest and uncertainty, and, possibly, above all things, the smooth working of railway traffic, upon which all industry and trade depends, was not realised. This last factor, coupled with the unsettled state of general business, led to considerable traffic congestion, an unsatisfactory state of affairs for which no adequate remedy has yet been applied.

Railway Working Under Competitive Conditions.

It is not the purpose of this article to discuss the prospects of trade and industry, except in so far as future developments affect the railway problem, and it may be well, therefore, at this point to say that, in subsequent remarks, it will be assumed that the 1920 boom will ensue.

Now, it cannot be denied that there is, at present, an unfortunate state of congestion on the railways. This naturally, has a retarding effect on the development of trade and industry, as the regularity of transit, which was once such a marked feature of British railroading, is all-important to progress. Let us, therefore, consider the general position.

At the beginning of the war British railway transport was performed by several independent companies which, whilst not exactly doing their best to put each other out of business, were certainly competing very strongly for traffic. Large staffs of canvassers were employed by each company for the purpose of encouraging traffic and, incidentally, abstracting as much as possible from competitve companies, this statement being subject, of course, to some qualification by reason of the working agreements of a few groups of companies and the territorial allocation of certain classes of traffic.

Generally speaking, however, competition was the order of the day, and those responsible for operating the traffic had to work it with reasonable regularity if they were to keep it. Thus railway competition, which has been characterised "the life-blood of industry and commerce," proved adequate to meet all requirements, and certainly had a great deal to do with raising British railway working to such a high standard. In his book, "The American Transportation Question," Mr. S. O. Dunn remarked on this point that "the fastest and most regular freight transportation in the world is that of England."

Railways and the War.

Would that this statement still held good! On the contrary, it must be admitted that railway goods traffic is not now being handled with sufficient promptitude and regularity. It is not the fault of the railway companies. During the war, when all efforts had to be concentrated on one supreme object, it was just a case of carrying on. The provision of additional facilities, which

Digitized by Google

would naturally have followed traffic development in the ordinary way, had to be held up, and it is a melancholy fact that, even now, uncertainty as to the railway future has not assisted to make good the needs in this direction. The railway companies of Great Britain made a brave showing throughout the war. Apart from the number of men released for the forces, the British companies supplied a large number of locomotives and wagons, and even a considerable mileage of track, to meet urgent war needs. They are paying the price of this to-day.

Competition, which helped to make British railways the finest in the world, has now gone, and in its place we have a Ministry of Transport, the full scope of which no man knows, directing the policy of the railways. As from January 1, moreover, the Railway Executive Committee, which performed such splendid work during the war by operating the railways as "one complete entity in the interests of the State," has been superseded by a Railway Advisory Committee, which will actually have no executive control. We are, therefore, brought now to the position that each railway will nominally be operated by its own directors and officers, subject, however, to the control of the Minister of Transport.

It is a peculiar position, and until the Minister of Transport definitely indicates the policy of the Ministry, it is unlikely that there will be any great improvement in the railway position. Until the recent revision of rates, moreover, the officers of the several companies were in the unhappy position of knowing that, actually, the concerns they were operating were insolvent by reason of the large concessions made by the Government to railwaymen generally, and to the enormous increase in the cost of materials.

Enough has been said to indicate that the British railway question is a complicated one. It bristles with financial, administrative and operating problems. But as in this article we are mainly concerned with the traffic problem we will now turn to a consideration of railway freight traffic.

Pre-War and Post-War Methods.

In the good old days railway freight traffic was worked on very different lines from those in operation to-day. A trader desiring to forward traffic had his choice of route, and was pretty generally certain of being able to dispose of his traffic whenever he was ready so to do. This is not so now. Under the traffic allocation scheme, which was introduced as a war measure, and will certainly be continued as a permanent feature of British railroading, the traffic between any two points is definitely allocated to a particular route, and all traffic between these two points must flow along the regular stream. This scheme has great potentialities for economy. Whilst it undoubtedly requires a considerable amount of adjusting and equating in order to meet many legitimate grievances on the part of the traders, it is a definitely forward step towards scientific railway working. At the same time it has not yet been sufficiently developed to ensure reasonable regularity of transit. Once this has been done the traders will certainly be more satisfied, and the railway companies' work will be simplified.

Another scheme, introduced since the war, with a view to more economic working, is that picturesquely termed "Nominated Loadings." This is an offspring of the traffic allocation scheme, and represents a complete change from old-time methods. In essentials it is this. Traders are invited to co-operate with the railway companies by arranging for their small consignments to be bulked for despatch on specified days of the week. There has been a tremendous growth in the number of small consignments, and this necessarily means increased difficulty in handling because a lot of the traffic would ordinarily pass to a transhipping point, there to be made up into through wagons for destination. The "nominated loadings" scheme aims to avoid this by making up through wagons from starting point to destination. Traffic from A to B, C and D, may, for example, be forwarded on alternate days. The results have been fairly successful. One large company, which handled no more than 2,000 tons of small consignments weekly in this way during the early weeks of the scheme, is now aggregating 10,000 tons per week, and as there has been a steady increase it is manifest that there is a great prospect of considerable expansion. The fact that this system of working keeps a large amount of small consignment

Digitized by Google

traffic out of the transhipping stations is of considerable advantage, and in order that this shall be done in an increasing degree many companies have now returned to the old-time method of forwarding through to destination any wagon loaded with one ton or over. This was arranged because it was found that the transfer of lightly loaded wagons to transhipping stations was, instead of economising wagon-user, actually extending immobility, for the reason that the transhipping points were in such a congested state that wagons might conceivably be standing three or four days before being handled.

Railway Cartage Requirements.

One cannot resist a reference to the Gattie scheme in this connection. As is well known, Mr. A. W. Gattie, the prime mover in the idea of a system of central goods clearing houses throughout the country, pushed forward his scheme with such vigour that at length the Board of Trade appointed a Departmental Committee to report on his proposals. The hearing of the evidence for and against the idea occupied many days, and the Committee have now issued their report, which is unanimously opposed to the idea, not only on financial grounds, but because they are convinced of its impracticability. One important point that aroused great interest during the hearing was the announcement that the railway companies operating in London were jointly considering a scheme for the unification of London railway cartage arrangements. This, it is expected, will follow the lines of that now successfully working on the Midland, whereby the cartage strength is controlled from a central point by means of telephonic communication. The adoption of such a scheme would probably lead to considerable economy and assist the railway companies to cope with their freight traffic, for cartage strength is one of the principal points to determine in any proper appreciation of terminal facilities and their traffic capacity.

Railway Congestion: Causes and Effects.

During the last few months the daily papers have been paying increasing attention to transport matters. This would be very beneficial if the information published were accurate, as there is a deplorable lack of knowledge on the part of the general public as to the difficulties of railroading.

Railway congestion has been a headline for some time, and the press experts have discovered that the cure lies in provision of more wagons. This, however, is a fallacy. It may be that the increasing traffic of the country will require a more adequate wagon supply, but at present it is not the shortage of wagons that is causing congestion. The shortage of wagons is the effect of congestion, and not the cause, as a few moments' reflection will show. If railway terminals, ports, &c., are blocked with wagons, standing under-load, it is fairly logical to suppose that any additional supply of wagons would merely add to the trouble and not remedy it. On the contrary, once the terminals are cleared the number of wagons is adequate on all counts. So long as the number of wagons in the country is sufficient to meet the maximum normal requirements of trade and industry, it would be a policy wholly wasteful to add to the wagon stock, for each wagon must occupy valuable siding accommodation when not running, and also represents uuproductive capital expenditure.

In the *Times*, dated January 2, appeared a letter from Mr. W. M. Acworth, M.A., dealing with the question of congestion, in which he points out that we, in England, are by no means alone in having congestion on railways. Many other countries not only have congestion, but such a thorough state of railway disorganisation that they have had to suspend both passenger and freight services from time to time in order to deal with the problem. He also explains that the congestion is the aftermath of war. His letter was a timely one. Railway congestion in this country has been caused by a variety of factors. The shorter hours of the railway day, the fact that railwaymen, as many others, seem to be exerting themselves less despite their advanced remuneration, the necessity of wholesale improvements in the facilities —all these things play their part.

What of the Future?

The railway companies of Great Britain are faced with a big problem, but once they are delivered from the uncertain

Digitized by Google

position they occupy it is with confidence that one predicts a speedy solution.

Freight traffic working is, in the future, to be on highly-developed scientific lines. The method of operating the traffic may be altered very radically within a short time. One sees no reason why the Continental method of working should not be adopted. Speed has a commercial value, and it would appear high time that differential rates were put into force for "fast" and "slow" traffic. The bulking of consignments for the "slow" method of working should permit of very effective wagon-user, whilst the scheme would bring in additional revenue, and it would seem that the more complete arrangement of goods traffic handling on the allocation system would leave plenty of accommodation. It is possible that the information made available by the new statistics, now being prepared by the railway companies for the Minister of Transport, will prove a useful guide in connection with such innovations.

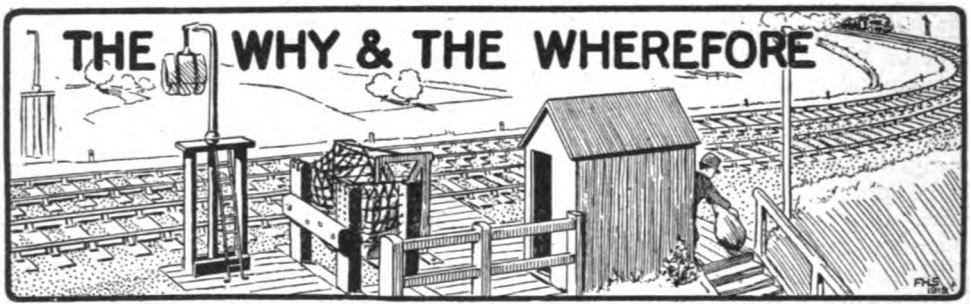
With regard to conveyance it is possible that a well-organised system of large yards, located at strategic points, and linked with special roads for the haulage of relatively slow-moving, heavy trains will be introduced. This would, at any rate, solve the problem of track capacity. Pilots operating from these large yards would run at a high speed and take turn with passenger trains, and would not, therefore, need much special accommodation. One important advantage in the vicinity of large towns, moreover, would be that the large goods stations, now so hopelessly incapable of accommodating the traffic pouring into them, would be relieved of all wagons immediately they were emptied, and would not receive full wagons until they were reasonably able to deal with them.

Another point. It is my belief that a scheme of goods traffic regulation which I have advocated on more than one occasion, could successfully be adopted. In fact, I am convinced that the inauguration of some scientific control of this character will eventually be found essential. The capacity of each terminal could then definitely be ascertained, and the volumes of traffic be governed on the basis of data regularly furnished to the regulating officer. With a full knowledge of traffic conditions all over the line (or lines) this officer would be in a position to ensure that no terminal was overtaxed, whilst he would equally be able to see that it was worked as far as possible to capacity. At the same time he would have responsibility for enlarging terminal capacity by introducing up-to-date machinery and appliances thus rendering it possible for more wagons effectively to be handled. The danger of congestion is always present immediately a terminal receives traffic beyond its handling capacity—or its clearance facilities—and it is in the direction of an improvement in such facilities and not by means of additional rolling-stock that congestion will be obviated.

Railway track and terminal capacity is the factor governing free traffic movement, and once the delayed improvements to the facilities are carried out it will speedily be found that there are plenty of wagons to meet the maximum normal demand. The new rates, which will certainly help all other forms of transport to compete more strongly with the railways, will undoubtedly help to relieve the railway situation, and it is confidently expected that the application of higher demurrage charges will impel traders and others to clear wagons more promptly, and thus increase the number of traffic units available for haulage.

A later article will discuss certain possible improvements in goods traffic conveyance, and, by reference to the methods in operation in other countries, show that traffic working generally might be facilitated by a change in the rating policy and the adoption of a new form of organisation. In the meantime, it will be sufficient here to say that one of the most essential things at the present time is a declaration of railway policy by the Minister of Transport. Uncertainty as to the future is the great bar to railway improvements. Once this is removed there can be little doubt of a speedy improvement in the railway situation and a return to something like the regularity of transit customary in pre-war days. That is the urgent need of those responsible for trade and industry, and it is what they must have if the full benefit of trade improvement recently forecasted by Sir Auckland Geddes is to be obtained.

Digitized by Google



Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which, published in April,* 1919, *is out of print but a new one is in preparation, in readiness for publication in April,* 1920, *Price* 5s., *By post* 5s. 6d.

Avon & Gloucester Tramway.

This old line was fully described in the RAILWAY MAGAZINE, December, 1909. It extended from Mangotsfield, connecting with the Bristol and Gloucestershire Railway (now Midland) at the Avon. It gave access to several collieries, and as the general tendency was downward to the river the horses employed were able to take considerable loads. Near the river the tramway divided to serve wharves at two places on the river bank, where coal was transhipped to serve Bath and district. Gauge was 4 ft. 8 in., with occasional passing places. The present Midland line from Mangotsfield to Bath follows approximately the route of the old tramway, cutting across its path in several places. Our querist thus describes the line as he has explored it: "From two points on the Avon, each fitted with a turntable, a weighbridge and a stone-built wharf, the line closely follows the Midland Railway, crossing it between Bitton and Mangotsfield. There are several cuttings and tunnels. The rails, of the usual tram pattern, and some stone and some wood sleepers, have lately been taken up, and the line is overgrown with brambles and blocked by fallen earth. The weighbridges and turntables are removed and filled in. At one time there was a board by the line at Keynsham inscribed 'Avon and Gloucester Tramway.'"

[Reply to "MIDLAND"]

Metropolitan and Metropolitan District Railways.

These are, and always have been, entirely distinct railways, and the use of the usual abbreviation of the name of the latter to "District" avoids possible confusion, though it is correctly the Metropolitan District. The Metropolitan Railway offers certain public facilities in conjunction with the District and other underground lines, and accords and utilises running powers in association with the Metropolitan District, also owning lines jointly with that company, so that the term "Underground" can be legitimately used to describe briefly either system; but the Metropolitan Railway is not included in the combine operated by the Underground Electric Railways Company of London, Limited, whereas the Metropolitan District Railway is a leading component. The Metropolitan is associated with the Metropolitan District Railway in one of the Bills now before Parliament in view of the joint ownership of Aldgate East Station, but is not concerned in that which covers proposed increases in fares and charges, which is

Digitized by Google

promoted only by the "T.O.T." combination of public service agencies. You should consult the *Railway Year Book* (of which the 1920 edition is now in course of preparation), for information of this class.

[Reply to "MET."]

Last Broad-Gauge Train, Great Western Railway.

The last broad-gauge train to leave Paddington for Penzance was the 10.15 a.m. "Cornishman" on Friday, May 20, 1892, but the 5 p.m. for Plymouth was actually the last from Paddington for the West Country.

It is difficult to ascertain, from the varying accounts, all the details of the last journeys by broad-gauge trains, but it would appear that while the 10.15 a.m. "Cornishman" from Paddington on Friday, May, 20, 1892, was the last for Penzance, the 5 p.m. for Plymouth was the last for the western counties, and that did not reach its destination until early morning next day. In the opposite direction the last train was the afternoon mail train from Penzance on the Friday, arriving in London early on Saturday morning. Engines and rolling-stock of these and branch trains had then to be worked up to Swindon, so that Saturday, May 21, 1892, is more correctly the last day when broad-gauge trains were run.

[Reply to C. COGHLAN.]

Night Indications of Distant Signal.

Coligny-Welch "illuminated fishtail" signal lamps are the only ones in anything like extensive use, whereby distant signals are differentiated from stop signals at night, except for the use of yellow on underground lines and for three-position signals. This type is used extensively by the London, Brighton & South-Coast, South Eastern and Chatham, London and South Western and Great Eastern Railways. The "Aga" flashing lamp is also employed for distinguishing distant signals to some extent. Both methods meet with considerable approval, but the problem is not so acute as it may appear to be on first suggestion, seeing that enginemen must be absolutely familiar with every signal on the road, whether by day or by night, and the risk of mistake from this cause is very limited.

[Reply to G. T. HART.]

Piloted Trains and Water Troughs.

There is generally some arrangement arrived at between the driver of the "pilot" and the driver of the train engine as to taking water from the track-troughs. On a line such as the London and North Western, where troughs occur comparatively frequently, it is possible for the two engines to make use of alternate troughs for replenishing the tender supply. Otherwise it is necessary for both to take as much as possible from the same trough, the leading driver withdrawing his scoop when about one-half of the trough has been covered. Generally speaking, of course, the water consumption of both engines is comparatively low, as the piloted train rarely represents in weight the full combined haulage capacity of both engines.

[Reply to ERNEST C. BEDFORD.]

Locomotive Sheds.

It is generally the custom with large railway companies, for administrative purposes, to group their engine sheds in such a way that one important shed has the supervision of other minor sheds in the vicinity. Thus, on the London and North Western Railway, Bletchley (No. 3) shed covers also Aylesbury, Banbury, Bedford, Cambridge, Leighton, Newport Pagnell and Oxford, all of which bear the same shed number. Similarly Leamington shed on the Great Western Railway, to which you refer, comes under Tyseley. Stafford shed, on the London and North Western Railway, is numbered 14.

[Reply to J. N. RATCLIFF and O. POSTGATE.]

Routing of Coal Trains from Aberdare.

From Aberdare these trains, when destined for Newport and points east of the Severn Tunnel, travel over the Swansea-Pontypool Road main line from Aberdare as far as Sirhowy Junction (Pontllanfraith), whence they pass by a spur on to the London and North Western Company's Tredegar branch near Ynysddu. Following this route south they pass on to Great Western Railway metals again by the end-on junction at Nine Mile Point, and join the main Western Valleys line at Risca, whence it is a direct run to Bassaleg and Newport.

[Reply to "SILURIAN."]

Digitized by Google

Consumption of Steam.

In covering the same distance, taking a general average, the engine of a heavy express goods train will consume a great deal more steam than that of a non-stopping passenger express. The steam consumed by the engine of a stopping passenger train will vary considerably according to the weight and booked intermediate speeds, but if it is fairly heavy, again on the basis of distance covered, the steam consumed should be between the two extremes already mentioned.

[Reply to ERNEST C. BEDFORD.]

Newport-Pontypridd Direct Service.

We have no information as to any immediate resumption of this service by the Great Western Railway. A local service is now being worked by the Alexandra (Newport) Docks and Railway Company, with a rail motor over its own line between Pontypridd and Caerphilly (Rhymney), and by the Rhymney Railway, also with a rail motor, between Caerphilly and Machen (Brecon and Merthyr), over the route formerly traversed by the Great Western motors, to whch you refer.

[Reply to "SILURIAN."]

Railways at Hereford.

Presumably you refer to Barton Station, now used only for goods traffic, and the adjacent Moorfields goods station belonging to the Midland Railway. All passenger traffic is now dealt with at Barr's Court Station. The Midland Railway joins the Shrewsbury and Hereford Joint line by means of Brecon curve, and the triangle at Barr's Court North Junction enables Midland trains to reach Barr's Court passenger station. The latter is directly accessible to trains from Gloucester.

[Reply to G. S. HARTLEY.]

Midland Railway Rolling-Stock.

Three thousand, four hundred and thirty-three carriages of uniform class, 1,240 composite coaches, 84 restaurant cars, 23 sleeping cars, 1,930 other coaching vehicles, 48 electric motor-cars, 49 electric trailer cars, and 20 electric tramway vehicles are employed for passenger traffic on the Midland Railway. Information of this class can be obtained from the *Railway Year-Book*, of which the 1920 edition is now in preparation.

[Reply to G. T. HART.]

Three-Position Signals on English Railways.

The three-position signal outside Paddington Station, Great Western Railway, was erected mainly for experimental and demonstration purposes. On the new Keadby line of the Great Central Railway similar signals are employed, though of a different design; the new signals at Victoria, South Eastern & Chatham Railway, are also of this type. They will also be installed on the Ealing extension of the Central London Railway.

[Reply to J. A.]

Bradford "Through Lines": Midland Railway.

We understand that the directors of the Midland Railway Company, on December 18, intimated to an influential deputation from Bradford their unwillingness to recede from the position they had previously taken up in regard to the scheme of extensions in that city, and the construction of a through line. This refusal was on account of the cost being out of all proportion to the return.

[Reply to C. O. M.]

Super-elevation of Outer Rail on Curves.

By a printer's error the formula given in the January issue under the heading "Maximum Speed round Curves," for calculating super-elevation, was slightly incorrect. It should be: $S = G \times \frac{V^2}{1.25R}$ where S = super-elevation in inches, G = gauge in feet, V = velocity in miles per hour, and R = radius of curve in feet.

(Reply to H. W. OGG, and further reply to H. DE Q. MEARS.)

Temple Meads Station, Bristol.

Described, as a notable railway station, in the RAILWAY MAGAZINE, October, 1900. The Great Western terminus, opened 1840, is included in the old part used by Midland Railway trains, and constitutes what is now the extreme portion of that section of the station, used also for South Wales departing trains. The Bristol and Exeter terminus was at right angles, south of the Great Western station. It was opened 1844. [Reply to J. C. SEARLS.]

Wooden v. Steel Signal Posts.

It is not according to a definite rule that signal posts on the London and South Western Railway are of lattice steel construction, and that those on the London Brighton and South Coast Railway are of wood, as in point of fact, each company

Digitized by Google

makes use of both types of post. Generally speaking, however, the London and South Western authorities have a marked preference for lattice posts.

[Reply to "SUTTONIAN."]

Record Runs behind Great Northern Railway "Atlantics."

It is quite impossible for us to spare the space for detailing record runs in these columns. Mr. Cecil J. Allen gave his fastest journey behind a Great Northern Railway 4-4-2 in the 100th article of his "British Locomotive Practice and Performance" series, October, 1918, to which we must refer you.

[Reply to "COLWICK."]

Old Metropolitan Railway Locomotives on other Railways.

Rendered unnecessary by electrification of the London lines, old Metropolitan Railway steam locomotives have been sold at various periods to the Mersey, Cambrian and Nidd Valley (Bradford Corporation) Railways, also to the South Hetton and Sherwood Colliery Companies and to Messrs. Frazer and Sons.

[Reply to T. WROTTESLEY.]

Bogie Pivots.

Although in essentials the connection between bogies and body of passenger and other vehicles is in the nature of a pivot, the construction involves relatively massive parts, with cushioning, bearing, centreing and other fittings. The draw-gear is connected with the under-frame of the vehicle and not with the bogies.

[Reply to S. P.]

American Boat Specials.

These are now run regularly, as required, between London and Southampton, Liverpool and Plymouth, but, in the case of Liverpool and Plymouth, when the passenger list is not too great, an alternative method is occasionally to attach through boat portions to the regular trains. No American liners are at present calling at Fishguard. [Reply to T. C. ADKINS.]

"736" Class 4-6-0 Engines, London and South Western Railway.

Seeing that these engines have only been built recently, it is obviously impossible for them to have engaged in any "pre-war" runs. Mr. Cecil J. Allen, however, hopes to describe some notable recent footplate trips with this class in an early issue, probably March.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Slip Coaches.

A number of trains are now running on the Great Western, London, Brighton and South Coast, Lancashire and Yorkshire, and Great Eastern Railways, with slip coaches attached. These are too numerous to detail in these columns, but you can ascertain them for yourself by reference to "Bradshaw's Guide."

[Reply to "SUTTONIAN."]

Locomotive Whistles.

We are unable to account for the tonal iniquities perpetrated by some companies in regard to the whistles of their locomotives, to which you refer. Various factors may have combined to influence practice in this connection, and as a rule there is a reason for the selection of an unduly piercing or unmusical tone.

[Reply to "SEVENOAKS."]

Anti-Collision Buffers: Great Central Railway.

These are fitted to the latest set-trains for main line service, and to certain other vehicles. Presumably they will be included in the equipment of new stock, but naturally not a great deal has been built during the past few years. They were designed by Mr. Robinson.

[Reply to T. G. FENDICK.]

Great Western Railway Coaches on Metropolitan Trains.

We understand that two sets of Great Western Railway four-wheeled coaches have for some time been working by arrangement on the Metropolitan Railway electric services (hauled by electric locomotives) pending the delivery of new rolling-stock.

[Reply to S. E. HAMILTON.]

Numbers of Great Western Railway Locomotives.

You are probably correct in stating that when engines were sent overseas the number plates were removed, and on return the original number was painted on the cab sides pending the provision of new plates.

[Reply to A. J. BEARMAN and S. T. WHITE.]

The Great Eastern Railway and St. Pancras.

No Great Eastern Railway trains in regular service now use St. Pancras. The train you saw must have been the Great Eastern Railway Royal Train,

Digitized by Google

which departs from this terminus when members of the Royal Family travel from London to Wolferton.

[Reply to C. C. J. SIMMONDS.]

Metropolitan Electrification.

Powers have been obtained by the Metropolitan Railway to construct a branch from Rickmansworth to Watford, and if and when this is put in hand, as it is to be electrically-operated, electrification between Harrow and Rickmansworth must of necessity follow.

[Reply to C. C. J. SIMMONDS.]

A Signalling Query.

Until you put your query a little more clearly we fear we are unable to answer it. Are you referring to the length of the arms or the height of the posts, or both? If the latter, no general figure could be given. as this varies entirely according to location and other circumstances.

[Reply to "CLAUGHTON."]

8 a.m. ex-Waterloo, London and South Western Railway.

The Plymouth portion of the 8 a.m. *ex*-Waterloo goes forward from Exeter at 2.5 p.m., and reaches Plymouth (Friary) at 5.15 p.m. It is passed at Okehampton (arr. 3.14 p.m., dep. 3.57 p.m.) by the 10.50 a.m. *ex*-Waterloo.

[Reply to "L.S.W.R."]

Telephone Cabin, Baker Street, Metropolitan Railway.

The small cabin near Baker Street Station to which you refer is provided to enable drivers to telephone to the signal box in the event of trains being delayed at the signal. Hence the letter "T" on the cabin.

[Reply to F. CLIVE.]

Edgware Extension: London Electric Railway.

Although powers exist for the extension of the "Hampstead" tube railway from Golders Green to Edgware we understand that work has not been commenced, and the site for the proposed station at Edgware is yet uncertain.

[Reply to E. BODEN.]

The "Pollitt" Singles, Great Central Railway.

Superheating equipment has not yet been added to the whole of these engines. The singles work over the Cheshire Lines Committee's routes, for which locomotive power is supplied by the Great Central Railway.

[Reply to J. V. HALL.]

Anti-telescoping Appliances, Great Central Railway.

The large toothed steel appliances on the ends of the modern Great Central 60-ft. cars have been designed by Mr. J. G. Robinson, the Chief Mechanical Engineer, to engage in the event of a collision and thus prevent telescoping.

[Reply to J. V. HALL.]

Midland Railway 0-6-0 Engines.

At the time of writing No. 3901 is the latest engine of the "3835" superheater class put into service. The L.T. and S. section 0-6-0's, Nos. 2898 and 2899 are, so far as we know, still confined in their working to that section.

[Reply to H. E. WOOD.]

Camden and Bushbury.

Camden engine shed is adjacent to Chalk Farm Station on the London and North Western Railway, and about one mile out of Euston, while Bushbury shed is a similar distance on the Crewe side of Wolverhampton.

[Reply to "LEVENSHULME."]

Distance Indicators, Metropolitan Railway.

The numbers you have noted in the tunnels between Baker Street and Aldgate are for the guidance of the permanent way staff and refer to the chainage, ranging from 1 to 19 for each quarter mile.

[Reply to F. CLIVE.]

4-6-0 Locomotives: Caledonian (ex Highland) Railway.

The engines to which you refer were built for the Highland Railway, Mr. F. G. Smith being Locomotive Superintendent, but were transferred by arrangement to the Caledonian Railway.

[Reply to "ELK."]

4-6-0 Locomotives: London and South Western Railway.

The 736–745 series of 4-6-0 express engines work entirely between London and Exeter or Bournemouth West. See also reply to G. E. H. Roberts-Hay-Boyd.

[Reply to R. C. MOORE.]

R.O.D. Locomotives on the South Eastern and Chatham Railway.

We understand that some of these engines are being used by the Managing Committee, but cannot say whether or when the Hull and Barnsley 0-6-0 locomotives will be returned.

[Reply to J. N. RATCLIFF.]

Digitized by Google

PERTINENT PARAGRAPHS

The Railway Executive Committee's Valedictory.

AFTER an existence which has lasted from the beginning of the war, the Railway Executive Committee ceased its functions on December 31, and the following day gave place to the new Railway Advisory Committee, consisting of 12 general managers and four representatives of the railwaymen. The number of railways and railway joint committees taken over by the Railway Executive Committee on the declaration of war was 130, representing a mileage of 21,331. Only 2 per cent. of the railway mileage of the country was left out.

We have pleasure in publishing the following letters which have passed between the War Office and the Railway Executive Committee, relative to the magnificent work performed by the members of the Committee throughout the war and during the period of demobilisation.

" War Office, S.W. 1.
" December 17, 1919.

" SIR,—The Army Council understand that the Railway Executive Committee, as at present constituted, will cease to exist at the end of this month. I am therefore commanded to inform you that the Council desire to take this opportunity of expressing their very great appreciation of the untold assistance which has always been so readily and courteously rendered, officially and unofficially, both collectively by your Committee and also individually by each member and by the staff, throughout the war and during the period of demobilisation.

" The sympathetic assistance of the Railway Executive Committee and their staff has been of the greatest value, both materially and morally, in enabling the staff of the War Office to cope with the many difficult transportation problems that have arisen in connection with the war, and I am to ask that you will be so good as to convey this message of appreciation to all concerned.

" I am, Sir,
" Your obedient Servant,
" (Signed) B. B. CUBITT.

" The Acting Chairman,
" Railway Executive Committee."

" Railway Executive Committee.
" December 23, 1919.

" DEAR SIR,—I have to acknowledge the receipt of the letter of the 17th inst., signed by Mr. Cubitt, conveying the appreciation of the Army Council of the assistance which has been rendered to the War Office by the Railway Executive Committee since the beginning of the war. I am desired by my colleagues to tender you their thanks for the kind remarks of the members of the Army Council, and they wish me to say that any help they were able to give to the military authorities during the strenuous years of the war and the period immediately following the armistice, was very gladly rendered in order to further the cause we all had at heart.

" We also wish to record our appreciation of the courtesy and consideration which this Committee and the railway companies received from all departments of the War Office, the Command Headquarters and the military authorities generally throughout the country.

" Yours faithfully,
" (Signed) H. A. WALKER,
" *Acting Chairman*.

" The Secretary,
" War Office, S.W. 1."

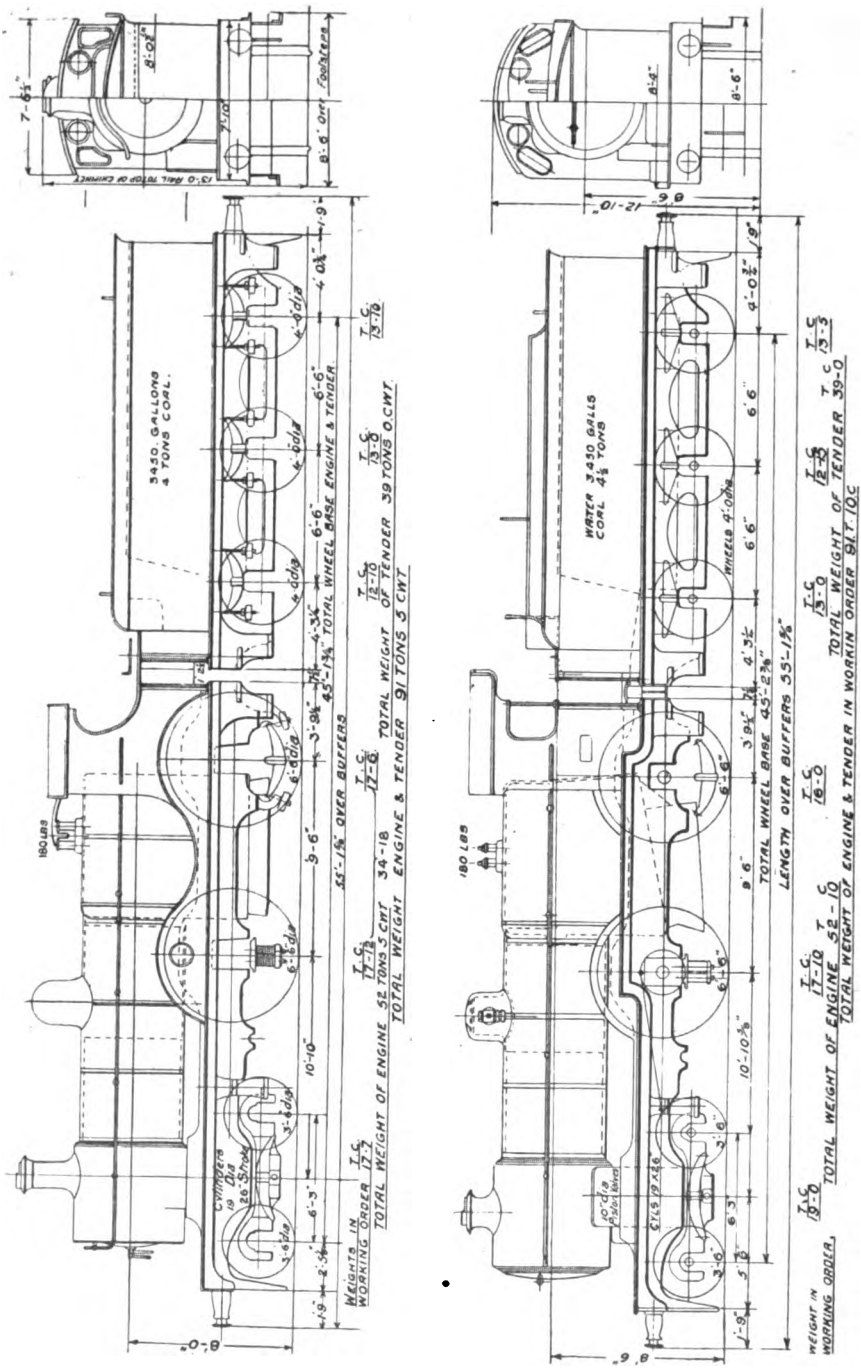
Rebuilt Superheater 4-4-0 Locomotive: South Eastern and Chatham Railway.

IN April, 1919, the first engine of a class formed by rebuilding an existing series, was completed to the designs of Mr. R. E. L. Maunsell, Chief Mechanical Engineer. This engine, No. 179, is illustrated by the photograph reproduced as frontispiece.

The original engines of the series were saturated steam locomotives built specially for working the boat train traffic over the Chatham section of the South Eastern and Chatham Railway between Victoria and Dover, and they are the heaviest locomotives of their type permissible on that section of the line. They were also used for heavy express traffic on the South Eastern section until the 760–781 enlarged class superseded them, No. 179 having at one time been a boat train engine on those services.

The problem, therefore, in rebuilding the

Digitized by Google



4-4-0 TYPE EXPRESS PASSENGER LOCOMOTIVE, SOUTH EASTERN AND CHATHAM RAILWAY. BEFORE AND AFTER REBUILDING. MR. R. E. L. MAUNSELL, C.B.E., CHIEF MECHANICAL ENGINEER.

Digitized by Google

engines as superheaters was that the original weight should not be materially exceeded so as to provide increased power capacity without infringing weight limitations on the Chatham section. How this has been accomplished will be seen by a comparison of the original and new dimensions from which it will be noted that, although the size of the firebox and grate area has been enlarged and the boiler has had the superheater added, thus increasing the efficiency and utility of the engine, yet the original weight has only been exceeded by a total of 5 cwt.

The superheater is of the return tube live heat type of the design introduced by Mr. Maunsell in his previous new types, namely, the 2–6–4 tank and the 2–6–0 tender engines. The superheater header and regulator, piston valves and pistons are interchangeable with the latter engines.

This rebuilt engine has given such satisfactory results that 10 more are now under reconstruction at the works of Beyer, Peacock & Co., Limited, Manchester, and when these are completed a further 10 will be put in hand. The following list of dimensions shows the comparison before and after rebuilding :—

	As built	As rebuilt
Cylinders—		
Diameter	19 in.	19 in.
Stroke	26 in.	26 in.
Valves	Slide	Piston (10 in. diam.)
Wheels—		
Diameter	6 ft. 6 in.	6 ft. 6 in.
Heating surface—		
Tubes	1,396 sq. ft.	large tubes, 322·25 sq. ft. Small tubes, 827·6 sq. ft.
Firebox	136·0 sq. ft.	127·13 sq. ft.
Superheater	—	228·0 sq. ft.
Total	1532·0 sq. ft.	1504·98 sq. ft.
Grate area	21·15 sq.ft.	24·0 sq. ft.
Working pressure	180 lb.	180 lb.
Total weight in working order—		
Engine	52 tons 5 cwt.	52 tons 10 cwt.
Tender	39 tons	39 tons

Railway Rate Increases.

A "REGRETTABLE NECESSITY," the general increases in railway rates and charges for goods, mineral and parcels traffic, which came into effect on January 15, appear to be well compiled to avoid inflicting hardship upon any section of the industrial and trading community, while there is no justification for any serious additions to the final selling prices of commodities used by the general public. The new charges should enable the railways to operate once more on an economic basis, so that during the remaining period they continue under Government control and guarantee the demands upon State finance (for which there is now only limited justification in view of the cessation of most of the traffic which the guarantee was designed to cover) will be substantially and possibly more than covered. Incidentally, the new scale of charges will place railway transport again in proper relation to other forms of public service transport, and thus tend to create a correct distribution as between the various agencies. A further factor which will improve the general traffic situation is the tightening up of demurrage regulations and the revised scale of charges therefor, so that, in conjunction with the overtaking of arrears of wagon repair, new construction and return of vehicles from overseas, it should not be very long before a substantial improvement in traffic working efficiency can be realised and congestion materially relieved.

Foodstuffs and perishables are advisedly dealt with lightly, and as most of these were already rated on a basis which gave very low charges per usual retail selling unit—frequently a small fraction of a penny—there is no justification for appreciable increases in final sale prices to the general community. Indeed, milk is not subjected to any increase, while agriculture is assisted in the same way in regard to manure, basic slag and lime. Coal, coke, patent fuel, and other merchandise in Class A are treated leniently, with increases of 25 or 30 per cent ; Class B goods are subject to 40 per cent. ; while Class C, Classes 1–5 of the general railway classification, live stock and other sections of traffic are affected to the extent of 50 and 60 per cent. Small parcels traffic bears increases of 100 per cent., as this requires far more handling, and entails further services than for goods subject to lower increases. All these rates involve a small flat rate addition, irrespective of distance, to assist in meeting the heavier costs of terminal and incidental services rendered. Existing surcharges for merchandise and livestock traffic between Great Britain and Ireland are reduced to specific amounts. The charge for wagons supplied to traders, when not included in the conveyance rates, is increased by 50 per cent., while collection and delivery charges are also raised. The minimum cloak room charge becomes twopence.

It is understood that the new scales of rates and charges will be continued for 18 months from the termination of the two years during which the railways remain under Government control and guarantee. This period will reveal any alterations or modifications shown to be necessary by experience. It is estimated that the revised charges will bring in about £50,000,000 increased revenue per annum, sufficient to balance the anticipated demand upon national revenue, and that without inflicting

Digitized by Google

undue hardship upon, or penalising in any degree, industry and trade or the individual citizen. The Ministry of Transport, and particularly the Rates Advisory Committee, which has dealt with this matter, are to be congratulated upon the production of what seems to be an equitable and reasonable solution of the problem created by the previously abnormal and uneconomic railway situation.

No Goods Clearing House.

THE Report of the Departmental Committee appointed to investigate Mr. A. W. Gattie's proposals for improving the handling of goods and traffic supports every criticism advanced against the scheme in these and other qualified pages. Mr. Gattie has, indeed, had an unique opportunity, were there real value in his suggestions, for the scheme had many features attractive to the general press, his grandiose conceptions provided sensational "copy" for popular publications, and his ingenious "trucker" mechanism appealed to the technical world, with the result that an almost unprecedented volume of free publicity was obtained. But this report should go far to answer the many allegations of bias, conservatism, deliberate obstruction to new proposals and railway mismanagement which have been so freely made by Mr. Gattie and his supporters. But the chief value is that the scheme has, for the first time, been judicially reviewed by an authoritative body, and their report must be given the standing which attaches to such consideration, as distinct from discussion before private and semi-private organisations such as Chambers of Commerce, the Society of Arts, Institution of Locomotive Engineers and the Railway Club.

There is no need to consider either the exhaustive and voluminous evidence placed before the Committee, nor their findings in detail; but the following statement of objections to the clearing house scheme in regard to London provides an effective summary:—

(*a*) The huge capital expenditure required.

(*b*) The displacement of a large population.

(*c*) The impracticability of the large volume of traffic involved being conveyed over the railway lines connecting the trunk systems and the clearing house.

(*d*) The concentration of the whole of the goods traffic in one spot, which would mean that all street traffic from whatever quarter, would converge on that particular area, thus creating a central congestion area.

(*e*) The necessity of maintaining most of the existing depôts, as coal and mineral traffic could not in the opinion of this committee pass to the clearing house.

(*f*) The complete upheaval of all the practices and customs of the carrying on of public trade which would result from the establishment of the proposed clearing house, worked as the New Transport Company desire, quite apart from its effects on railway working throughout the country.

(*g*) The fact that this proposed method of dealing with goods for sorting would increase the amount of handling; for, on the arrival of a train the container would be hoisted to a sorting floor where the goods would be removed by hand and placed on trays and then despatched to a specific berth where they would again be removed by hand, placed into a further container by hand, and returned by crane to street or train vehicle, as required; whereas, now, when the train arrives, goods are sorted as they leave the wagon, are then hand-trucked to specific berths and loaded on vans or on wagons, and are then ready for despatch.

Elsewhere in the report the enormous expenses which would be entailed, the necessity for co-operating clearing houses in all large towns, difficulties at intermediate stations, the congestion of road traffic which would be entailed, and the total inadequacy of contemplated railway connections—the suggestion that the Metropolitan Railway electric lines should be utilised for important goods traffic movements is enough in itself to condemn the scheme—are all carefully considered, with other aspects. But enough has been said to show the entirely adverse character of the report, which also contradicts allegations as to any antagonistic attitude on the part of the railway companies.

A "Traffic Hustler."

The traffic controller has figured in underground railway operation for some years; but the installation, as from Monday, December 29, at Victoria Station, Metropolitan District Railway, of a station traffic controller, or rather a station "traffic hustler," is a distinctly new development. It is not expected that this official, or the co-operating staff of platform men, will do more than ease the difficulties of the rush periods; but the mere fact that definite action is taken in the direction of expediting station work, a prime source of delay and overcrowding, favours improved operating efficiency. Whether credit for such improvement as has been realised is due mainly to the "traffic hustler," with his stop-watch and syren, or to the increased platform staff, is a moot question—probably both are equally concerned—but pending the supply of additional cars with more numerous and convenient door arrangements and further

Digitized by Google

Photo.] [*Topical.*

THE "TRAFFIC HUSTLER" IN HIS BOX AT VICTORIA, METROPOLITAN DISTRICT RAILWAY.

trains, every second which can be saved in this way is of value all down the line. Under ordinary conditions, once a train becomes crowded, detraining passengers are unable to alight expeditiously, new passengers are delayed, and the excess station time necessarily occupied causes a disproportionate accumulation of passengers at the next station, and so on. Gain at even one station is thus of far-reaching value, and with "traffic hustlers" and staff installed at several of the more difficult stations most of the cumulative overcrowding, which has become so characteristic once a train loses time in any degree, should become a thing of the past.

Value of Public Co-operation.

So satisfactory has this measure proved, that on Monday, January 12, another "traffic hustler" was installed at Charing Cross, and with traffic thus assisted a very distinct improvement should be noted throughout the system. Remark is made officially upon the fact that the success of the experiment is largely due to public realisation of what the sounding of the syren denotes, having already acquired the habit of keeping clear of the trains after the warning has been given. Indeed, it is already notable that the syren is now sounded on relatively few occasions, the increased platform staff, public co-operation, and the occasional sounding of the syren together providing distinct and valuable improvement influencing traffic all down the line.

In order to develop the equipment electric clocks automatically operated by trains when coming to rest, and showing the exact number of seconds since the train came to rest, are being installed. Also instead of there being one large syren in the centre of the platform, two or three smaller syrens distributed the length of the platform and operated by an electrical button by the controller are to be tried. At quieter stations it will not be necessary to have a platform controller, as the syrens can be automatically sounded from the clock at any given time, varying, of course, with the density of traffic at the station. The experiment at Victoria has shown a saving of 30 per cent. in station delays, fewer trains are stopped or checked approaching Victoria, and it is considered that, when introduced at Charing Cross, further checking and stopping of trains during rush periods in the tunnels will be averted. Hitherto, lengthy station delays to any particular train has tended, of course, to bunch the following trains. At Victoria station further improvements are to be carried out. The construction of additional "way outs" at the western end of each platform is about to commence shortly, and consideration is being given to similar facilities at the eastern end. The new interchange subway at Charing Cross is well advanced, and it is expected to be in operation in about a couple of months' time. These new features will considerably relieve congestion.

"Let it Pass."

In this connection one may suggest that in furtherance of the policy of "educating

Digitized by Google

the public by poster," concise explanations should be issued showing the cumulative effect of station delays, with requests that passengers shall refrain from boarding unduly crowded trains, indicating at the same time that the result of such action, systematically carried out, will enable each train to take only its proper share of the traffic load, while in the final event the passenger who has "let it pass" has lost nothing in time and gained in comfort of travel. If the public will not respond, a further suggestion may be advanced, that the traffic hustler be given limited control powers enabling him to instruct an overcrowded train to pass certain stations or to telephone ahead that no further passengers are to be allowed to board the train (the platform staff then taking necessary action to guard doors not provided with gatemen), special announcement being given by megaphone. Inevitably a few passengers would be overcarried, but this could not be avoided altogether, though the megaphone announcement should reduce it to a minimum. In any case the aggregate gain to many passengers, and to traffic expedition as a whole, would more or less compensate for the inconvenience caused to a few passengers.

Supplementary Access to Large Stations.

OVERCROWDING and congestion are not confined to the underground lines, and while the problems at large terminal and other busy stations are somewhat different, attention may be called to the necessity for separating conflicting streams of passenger movement in order to relieve congestion and facilitate traffic operation. Most of the larger railway stations were built in days when the engineers and architects concerned could have had no conception of traffic on the scale familiar to the present generation. Consequently few of the great termini have separate exit arrangements, though practical possibilities in regard to supplementary access have by no means been exhausted. The fact that the platform barriers are usually all based upon one or two circulating areas common to many platforms, constitutes a serious argument against the policy of concentration and centralisation once generally approved, and still desirable for other reasons. But a large proportion of passengers at the busy stations, especially on the suburban routes, do not require to purchase tickets, so that it should be sufficient to construct a footbridge or subway at a suitable position along the platform, reserved for exit traffic only or preferably available for access by non-booking passengers, this footbridge or subway connecting with a side thoroughfare so as to free the main circulating areas of a considerable proportion of passenger movements. If such a footbridge or subway can be provided well away from the ordinary barriers, or at the opposite ends of the platforms, its value would be greatest, but even if only a short distance away it would distribute the pressure inevitable when every passenger arriving or leaving, has to pass the one set of barriers. Such supplementary connections need not be used except at busy periods, and it does not follow that a largely increased staff would be required. At present it is quite usual for at least five minutes to be occupied before one can pass the barriers after detraining, and if two trains arrive about the same time on opposite sides of the same platform the delay becomes accentuated.

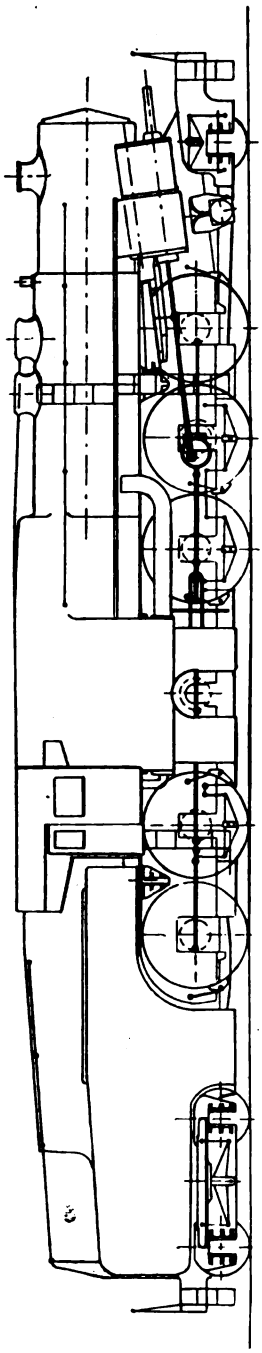
Another suggestion is that if the platform is of reasonable width, double barriers should be erected to form a central passage-way extending some distance along the platform, this being reserved either for arriving or departing passengers according to the direction of pressure, incidentally separating the streams to or from trains on either side of the same platform. As a rule such barriers would hinder the movements of platform barrows and the like, but during the suburban rush these are not so extensively required, and with separate luggage bridges or subways, such work could be largely restricted to the outer portions of platforms. In many instances neither of these suggestions is practicable; but where supplementary entrances or exits are already available passengers should be encouraged to make the fullest possible use of them, while in other cases it would appear to be essential that action as proposed, or on alternative lines to the same end, should be taken.

A Novelty in Locomotive Design.

USE of four, five or more coupled axles involves a lengthening of the boiler barrel so as to enable a sufficient proportion of the weight to be brought forward, but that extension is of relatively small value in regard to steam production. Therefore, if it is desired to increase the adhesion weight of the engine, an effort must be made to extend the coupled wheelbase in the rearward direction, where much weight is available that can be made useful for adhesion, while advisedly that of the tender should be utilised in some degree.

The diagram shows a design prepared by Mr. G. F. Berg, of the Java Railways, wherein it is sought to incorporate these principles. The design shows a wholly new departure from customary practice, distinctive features claimed for it being its economical proportions of weight and power, as well as increased power itself. These

Digitized by Google



A NOVEL LOCOMOTIVE DESIGN FOR WHICH INCREASED POWER WITH MORE ECONOMICAL PROPORTIONS AND DISTRIBUTION OF WEIGHT ARE CLAIMED

claims are supported by the following dimensions :—

Grate area	66·7 sq. ft.
Heating surface of firebox and combustion chamber	484·2 sq. ft.
Heating surface of tubes and flues	2,216 sq. ft.
Heating surface of superheater	753 sq. ft.
Steam pressure	200 lb. per sq. in.
Diameter of pistons ..	24·25 in.
Stroke of pistons	26·75 in.
Diameter of driving wheels	74·75 in.
Average total weight ..	269,230 lb.
Average adhesion weight ..	184,820 lb.
Average actual tractive force	37,500 lb.
Coal capacity of tender ..	8 tons
Water capacity of tender ..	6,600 galls.
Maximum horse-power ..	3,500 h.p.

Instead of one outside cylinder of the above-mentioned diameter on each side, there are two of smaller diameter, arranged tandem wise. Noteworthy elements of the design are the boiler and the arrangement of the axles.

The boiler is of an entirely new type that, it is claimed, must do away with the defects and troubles of the existing types. The boiler consists of two parts; one includes the firebox and combustion chamber, and is built as a kind of water tube boiler; the other part forms a cylindrical tubular boiler. The respective heights of the water level above the rails are different for both parts, the water level of the firebox being the higher. Free water circulation is possible to both parts, but the steam spaces are separated by a simple regulating apparatus that sustains the little difference in pressure between the spaces, due to the difference in heights of the water levels. As the result of the working of the apparatus the height of the water level of the cylindrical boiler is almost constant.

The object of dividing the water surface in this way is to raise the water level above the firebox, and with it also the grate, in order to obtain sufficient room underneath it for the clearance of the coupling rods, without interfering with the volume of the ashpan.

The flexibility of the engine for moving through sharp curves is, it is claimed, assured, in spite of the extension of the long coupled wheel-base, as the result of the symmetrical arrangement of the axles.

Railway Operation on the Baghdad Railway.

WRITING to Mr. Cecil J. Allen an old reader of THE RAILWAY MAGAZINE, Captain R. G. Gardner, serving with the Egyptian Expeditionary Force, gives some interesting particulars of railway working in Mesopotamia. A few extracts may be quoted :—

"I have been stationed for some months

Digitized by Google

just beside the long Amanus Tunnel on the Baghdad Railway, and have made many trips on the engines over this and the Taurus Tunnel sections. Trains runs from Aleppo to Adana three days a week (about 150 miles) 12 hours being allowed; stops are made at all stations. The line gradually rises from Aleppo to Katwa, but the interesting part is the mountain section through Amanus, from Islihic to Maswure, about 40 miles. From Islihic, 1,600 ft. above sea level; the line rises at 1 in 40 through four short tunnels to the big Amanus Tunnel, 3 miles long, the east entrance being about 9 miles from Islihic. From Airan, west entrance to tunnel, the line drops almost entirely at 1 in 40 for about 30 miles to Maswure, where we are on the plains again. It runs through a succession of 10 or 11 short tunnels through magnificent scenery. From Maswure the line runs across the plain to Adana. Leaving Adana next day a three-hour run across the plain brings us to Dorak, passing on the way Yenidjei, where the line to Mersina diverges. At Dorak the long climb up to Taurus tunnels starts, almost entirely at 1 in 40 to near the south entrance to tunnels. For the next 7 miles to Belamdek the line is entirely tunnel, except for about a dozen short breaks, so short that the whole of the train is never out of tunnel. The gradient is about 1 in 125. It is very wonderful. The river gorge is about 2,000 ft. deep, absolutely sheer. The tunnels are cut out of the rock about 700 ft. above the river, and the breaks in the tunnel occur where lesser ravines join the main gorge, and have to be crossed. After Belamdek the line rises at 1 in 125 through Bozanti and various short tunnels to Tchifte Khen, which is the western limit of British occupation. Here are very fine sulphur baths. The trip is exceedingly interesting."

Locomotive Working.

"The usual combination from Aleppo to Maswure is a 2-6-0 superheater piloting a 0-8-0. From Maswure to Adana a 0-8-0. From Adana to Bozanti a 0-10-0 superheater, piloted from Dorak (if necessary) by a 2-6-0 superheater. The maximum over the 1 in 40 mountain section is 140 tons for a 2-6-0, and 300 tons for a 0-10-0. There are two of the latter at Adana, which only work on the Taurus section. Of the above engines, only the 2-6-0's were built specially for the Baghdad Railway, and have 'Bagdad' in large brass letters on the cab side panels, and the directions for superheater, &c., printed in the cab are in French instead of German. They are full of 'gadgets.' From the left rear crank pin a mechanical lubricator is driven, from the right crank pin a combination speed recorder and apparatus for describing what the engine is doing all the time (similar to the Hasler apparatus). A notice says their maximum speed is 90 kilos per hour. Only one gauge glass. Three diagonal taps instead of a spare gauge glass. Pressure 18 kilogrammes per cubic centimetre. Coupled wheels about 5 ft. 3 in. These engines having been built for the Baghdad Railway were intended to burn wood, and have no brick arches. We are now running them on coal. Very comfortable and roomy engines to travel on. The Westinghouse brakes (all) and nearly all pressure gauges are out of working order. When I first came, and the engines were still burning wood, the method of firing was to stuff the firebox as full as it would go, and then she would not need firing for some time. These engines are numbered from 613 onwards, and were built in 1912 and 1913. The only other engines I have seen round here, specially built for the Baghdad Railway and labelled 'Bagdad,' are smaller 2-6-0's, built at Cail in 1906, and numbered about 605, and shunting tanks, numbered about 705. The 0-8-0's and 0-10-0's are apparently ordinary German engines sent from Germany, with the names of their districts, *e.g.*, Breslau, Danzig, still on them in brass letters."

Traffic Methods and a Run-away.

"The working of the line is somewhat primitive. Trains consist usually of two passenger coaches (put on quite lately) and about 15 closed trucks (many of them Belgian stock). About every third wagon has a brake and carries a brakesman, so speed has to be kept very low down the long 1 in 40 banks. I shall always remember my first trip. I was travelling on 2-6-0, No. 613, piloting a 0-8-0, and while labouring up the 1 in 40 to Amanus Tunnel three runaway trucks, which had been on their own for 6 miles, charged down the bank into us. Our engine was damaged and derailed, but all of us on the footplate escaped with small cuts and bruises. Further back in the train two men were killed. I can assure you it was a somewhat unpleasant three or four seconds waiting for the bump after sighting the trucks. My last trip was on London and South Western Railway No. 501A. That, and London and South Western Railway No. 27A, work supplementary trains over the Amanus mountain section, as ordinary trains are sometimes too heavy to be worked over it. Amanus is full of brigands. At Airan (Amanus Tunnel) we keep a loop-holed truck with a couple of motor cars fitted with railway wheels always in readiness. Next station is Bagche, which has figured in the papers lately in connection with the medical arrangements at the camp there,

Digitized by Google

when our prisoners captured at Kut were camped there and building the railway.

"At both ends of the Taurus Tunnels are a large number of Decauville engines, over 100 altogether. The locomotive stock eight months ago was in a very bad condition, but our locomotive authorities have worked wonders. We have not yet got rid of all the German engineers.

"The driver is not very easy to talk to. Some know a little French and some know no known language. On one red-letter day the fireman actually spoke a few words of English and gave me an orange. He had once been a ship's fireman."

showing the design (prepared by the Great Western Railway for standard use) adopted in such cases (see page 134).

Railwaymen's Wages.

EARLY in January the terms of the new offer to railwaymen promised in settlement of the recent railway strike, were made public by the Ministry of Transport, and, although resolutions rejecting the offer were passed by meetings of railwaymen at various centres, the terms appear, on the whole, to be so generally satisfactory that all unbiassed critics must agree with the view expressed by Mr. J. H. Thomas, that having

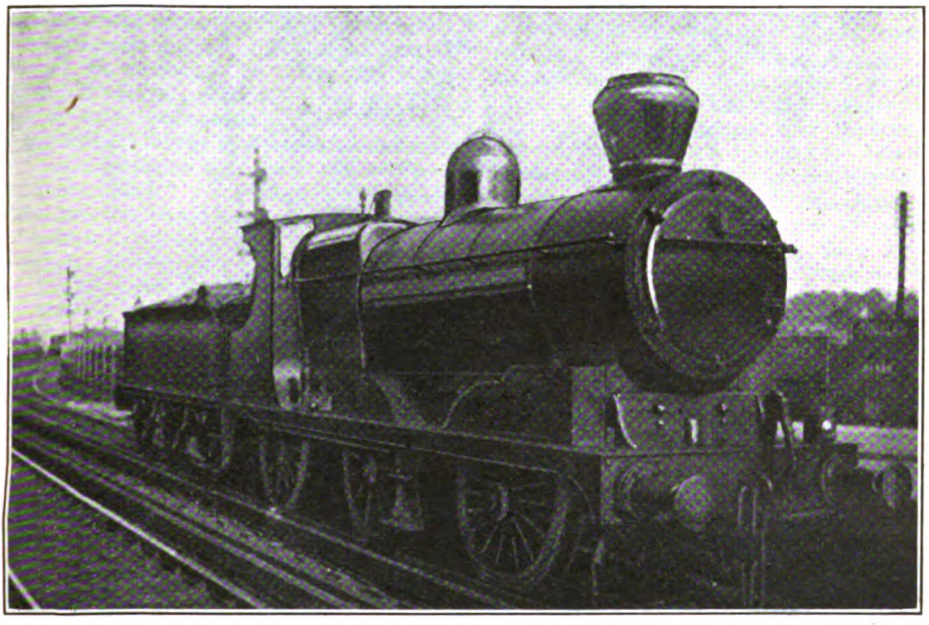


Photo.] **LANCASHIRE & YORKSHIRE RAILWAY.** [*R. F. Legget.*

0-6-0 locomotive fitted with spark-arresting chimney.

Spark-Arresting Smokestacks.

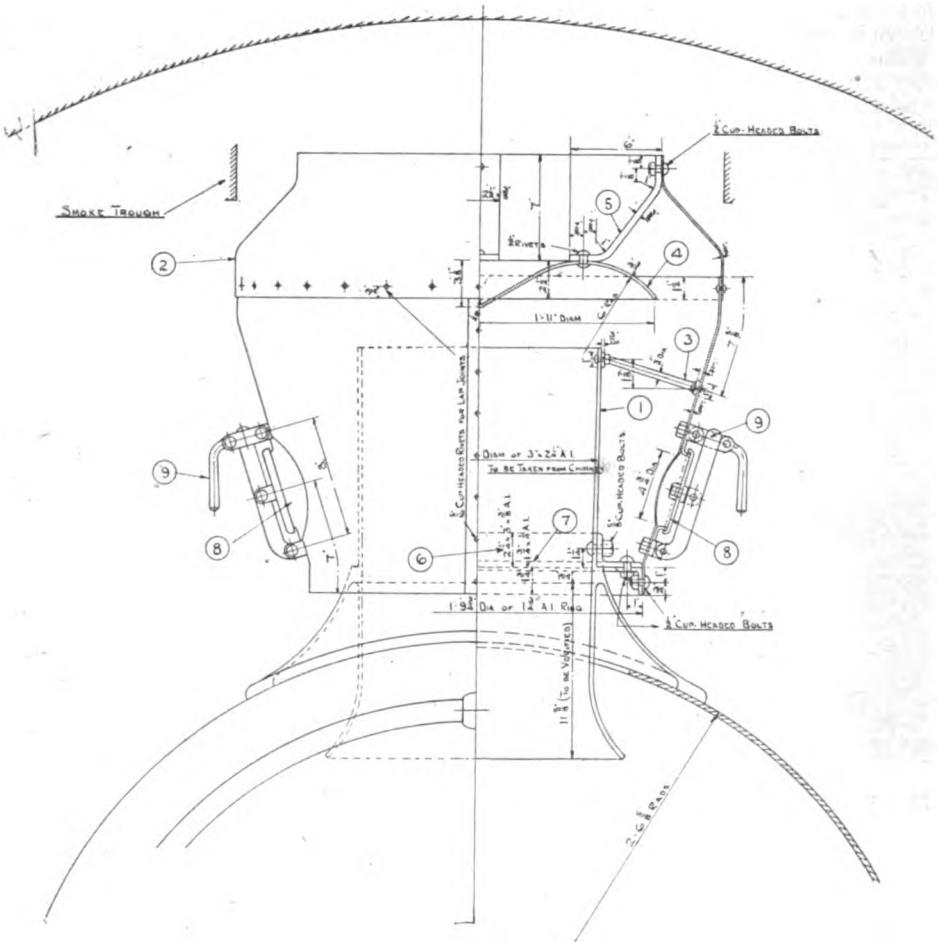
A LIVERPOOL reader, Mr. R. F. Legget, sends an interesting photograph showing Lancashire and Yorkshire 0–6–0 locomotive No. 416, fitted with a spark-arresting smokestack of the kind associated with wood-burning locomotives in other countries, This engine is one which, during the war, was engaged on special duties involving working in the neighbourhood of inflammable or explosive stores or buildings where dangerous occupations were in progress. On various lines a number of engines, principally of tank classes, were equipped in this way, and we are indebted to Mr. G. Hughes, Chief Mechanical Engineer, Lancashire and Yorkshire Railway, for a drawing

regard to all the difficulties, it is "the best settlement that we could have made." An important point is the removal of anomalies and simplification of grading, there being now only 88 grades instead of 512 to be considered, and this will simplify future negotiations. In the case of certain grades, special treatment had been necessary, and the increase of the war bonus from 33s. to 38s. is partly due to this fact. The settlement dates from January 1, and an additional £1 is provided for, to cover four weeks' retrospective pay. Moreover, the principles involved in this settlement are to be applied to grades not covered by the new conciliation grades. As a result, thousands of men "would get 9s. to 11s. a week immediate

Digitized by Google

advance. while no one suffered and everyone benefitted."

An increase of 100 per cent. above the pre-war rate is now the minimum advance in permanent wages, but there is to be no reduction in present earnings (plus the 5s. flat-rate addition now conceded) before September, 1920. Thereafter every rise or fall of five points in the cost of living figures will involve a rise or fall of 1s. But the new permanent rates will constitute "stop" figures below which no reduction will be made. Thus a Grade I porter in London, whose average pre-war wage was 22s. and who now receives 60s., can never fall below 46s., while the 18s. Grade I porter outside London, at present receiving 56s., has a permanent minimum of 40s. As, however, these minima cannot operate until the cost of living has been very considerably reduced, there is not much likelihood of figures approaching the limits being reached, by which time the present recipients should have received substantial promotion, while their successors will be as well off in proportion. For higher grades the permanent minima do not involve great reductions upon present payments. Re-classification and re-grading also involve benefit to many railway servants individually.



SPARK-ARRESTING CHIMNEY AS FITTED TO BRITISH LOCOMOTIVES WORKING IN THE NEIGHBOURHOOD OF EXPLOSIVE FACTORIES OR STORES OF INFLAMMABLE MATERIALS.

To deal with questions which may arise, adjustments, &c., a Central Wages Board is set up, consisting of 10 members, five representing the railway administration and five the unions, with power on either side to bring in a sixth member. If any matter cannot be settled thus, a National Wages Board is provided for, consisting of 12

Digitized by Google

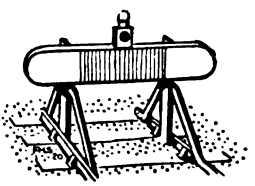
members, four representing the railway companies, four the unions, and four the users of railways, with an independent chairman appointed by the Government. Local machinery is to be set up to deal with local questions. It has also been agreed that no strike shall take place within one month of reference to the National Wages Board.

Notwithstanding, however, the favourable character of the settlement, it was at first rejected by the Delegate Conference of the National Union of Railwaymen. Sir Eric Geddes, Minister of Transport, was at once informed, and he replied, indicating that "as the lines of the Government's proposals were laid down by the Cabinet, and the issues involved are of national importance, affecting every section of the community," it would be necessary to bring the whole matter before his colleagues. Further conferences, and a special visit by Sir Eric Geddes and Sir Robert Horne to Paris to confer with the Prime Minister, occupied the week, a principal difficulty being that the proposed settlement was based upon average instead of maximum rates in each grade, and on Thursday, January 15, it was announced that "The Conference has decided by a very narrow majority to accept the settlement on the basis of the Government offer." In essentials, the settlement is on the lines set forth, with certain concessions to remove individual hardship in particular cases, and a degree of elasticity in the detailed application of the Government proposals.

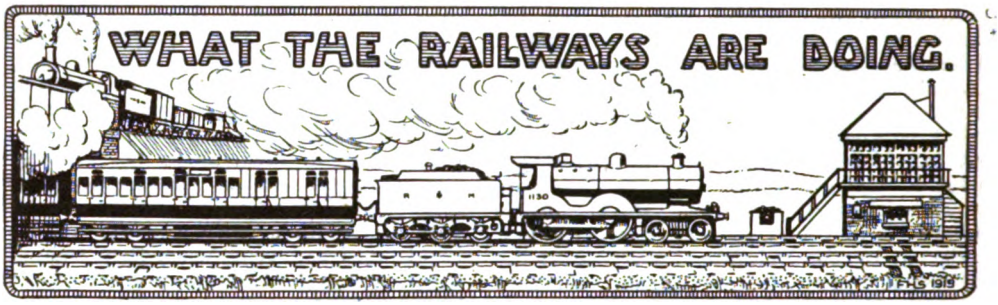
A Great Western Railway Locomotive Retrospect.

OUR correspondent at Bath, Mr. L. B. Hewitt, sends a few remarks constituting a 25-year retrospect of Great Western Railway locomotive practice, which includes several items of interest which may be quoted. "The year 1894 witnessed the introduction of two important and numerous locomotive classes, the 4–2–2 and the 4–4–0. The former, represented at first by 30 machines, and finally by 80—of which total 30 were conversions from the 2–2–2 type—is now extinct. The process of eradication commenced in 1908, about ten years after the last were built. These engines were numbered in the '3001' series, and after their destruction these numbers remained blank until last year, when they were allocated to the R.O.D. locomotives of Great Central design.

"Another landmark in our survey is that the adoption of the lighter shade of green for Great Western locomotives dates from the introduction of the new 4–2–2 and the (strictly speaking) renewed 4–4–0 locomotives in 1894. In the narrow gauge era the 4–4–0 type on the Great Western line was inaugurated by the four 'converted' 7 ft. engines, Nos. 7, 8, 14 and 16. The Great Western Railway usually gives 1894 as their building date, but strictly speaking these machines are renewed from broad-gauge locomotives. At all events, they may be regarded as the precursors of that numerous series of 4–4–0 engines—with 5 ft. 8 in. and 6 ft. 8 in. wheels—which are so well-known to RAILWAY MAGAZINE readers. In 1894 standard Great Western locomotives had inside cylinders, large brass domes and flush-topped or wagon-top fire-boxes. The Belpaire fire-box was introduced with the construction of the 4–4–0 'Badminton' class in 1898, and the domeless boiler was introduced in the following year, when *Waterford*, of the 'Badminton' series, was built. Outside cylinders became standard on the Great Western system in 1902, when the first 4–6–0 passenger engine, No. 100 (now 2900), *William Dean*, was constructed. The coned boiler was first employed on the 4-4-0 City type, built in 1903."



Digitized by Google



On being raised to the Peerage, Sir Albert Henry Stanley has assumed the style and title of Baron Ashfield, of Southwell, in the county of Nottingham. Born at Derby in 1875, at an early age the new peer went to America, where he became General Superintendent of the Detroit United Railway and General Manager of the Public Service Corporation of New Jersey. In connection with the reorganisation of the Metropolitan District Railway, he was selected to be Manager, and later full executive control of all the railways and associated transport agencies operated by the Underground Electric Railways Company of London, Ltd., was vested in him. He received a knighthood in 1914 and afterwards joining the Government he became parliamentary representative of Ashton-under-Lyne and President of the Board of Trade. As Railway Magazine readers are aware he has now left the political arena to once more engage in the transport business.

* * *

Consequent upon Mr. Reid's retirement the North British Railway directors have resolved that the work which has hitherto come under the supervision of the locomotive department, shall as from January 1, 1920, be carried on by two separate departments, and have made the following appointments which will operate from that date, viz. :—Mr. Walter Chalmers, to be chief mechanical engineer and Mr. J. P. Grassick to be locomotive running superintendent.

* * *

Mr. J. H. H. Bailey, of the Lancashire and Yorkshire Railway, who has been appointed Goods Manager of the North Staffordshire Railway, was born in Carlisle in 1878, and started his career as a junior clerk in the office of the General Manager of the Lancashire and Yorkshire Railway. One of the many positions he has held since that time was that of the Traffic Agent in the Midlands. During the war Mr. Bailey rendered excellent service as Inland Transport Officer for the Ministry of Munitions in the North-Western Area, and also as a member of the Road Transport Board. In April, 1919, he was appointed to succeed Mr. Slater as Deputy Assistant Goods Manager, Lancashire and Yorkshire Railway.

MR. J. H. H. BAILEY,
Goods Manager, North Staffordshire Railway.

* * *

As their Continental Traffic Agent in succession to Mr. W. J. Williams, who has retired from the service on account of ill-health, the London, Brighton & South Coast Railway have appointed Mr. Chas. Cooper. Only son of the late Mr. William Cooper, solicitor, of Congleton, Cheshire, Mr Chas. Cooper joined the service of the Brighton Railway in the goods department in 1886, being ransferred to the Continental Traffic Department under the late Mr. Victor Gerard in 1890.

Digitized by Google

Mr. Cecil G. Rose, who has been appointed Assistant Engineer of the North Staffordshire Railway, was articled in 1897 to Lieut.-Colonel C. L. Morgan, chief engineer of the London, Brighton and South Coast Railway, after joining the engineering staff of that railway. It is noteworthy that Mr. Rose's family has been connected with the Brighton line for three generations, covering about 60 years, both his grandfather, his father and his brother being solicitors to that company. In 1905 Mr. Rose was appointed Senior Assistant to the Resident Engineer of the Colombo drainage works in Ceylon. Two years later he was appointed to the Central Argentine Railway as one of its construction engineers, a position he held until 1912, when he rejoined the engineering staff of the Brighton Railway. In October, 1914, Mr. Rose was lent to the War Office to take charge of the construction of a length of the Southern defences of London. In November, 1915, he was granted a commission in the Royal Engineers, went out to

MR. CECIL G. ROSE,
Assistant Engineer,
North Staffordshire Railway.

France firstly in the R.O.D., and afterwards to Light Railways, being appointed as one of the construction engineers with the rank of major. He was demobilised in 1919, and rejoined the engineering staff of the Brighton Railway.

* * *

Mr. S. E. Fay, Assistant District Traffic Manager (Operating), Great Central Railway, has been appointed to an important position in the Traffic Department of the San Paulo Railway, Brazil, and will shortly sail for that country. Mr. Fay, who was educated at Malvern College, and McGill University, is the elder son of Sir Sam Fay, General Manager of the Great Central Railway, and joined the service of that company in June,

Photo.] [*Elliott & Fry.*

MAJOR S. E. FAY,
Traffic Department,
San Paulo Railway, Brazil.

1910, as a probationer at Brigg, Lincolnshire. A few months later he was appointed on the higher grade staff and pursued a course of training in all departments of railway work arranged for successful students. He concluded his training in August, 1914, and after a few months in London obtained a commission in the Royal Engineers, serving in the Railway Construction Division in France until 1916, when he was transferred to the Railway Operating Division. Later on he served in the Paris headquarters of the Inter-Allied Transportation Council, where he received his majority and appointment to D.A.D.G.M.R. Major Fay was demobilised in the early part of 1919, and was appointed Assistant Traffic Manager in the Southern Division of the Great Central Railway in May, 1919.

* * *

Mr. William Towle, on whom the honour of knighthood has been conferred, was formerly the Manager of the Midland

Digitized by Google

Railway Hotels and Refreshment Rooms. He entered the Midland service in 1864. Mr. Towle's great opportunity came in 1884, when his services were requisitioned to reorganise the St. Pancras Hotel, and to undertake its management. In 1885 the Queen's Hotel, Leeds, came under his control; in 1887 the Midland Hotel, Bradford, was added; in 1891 the palatial Adelphi at Liverpool followed suit; and the hotels at Morecambe and Heysham in due order came into line with the rest. The Midland Hotel at Manchester, one of the finest in the kingdom, was opened in 1903. Mr. Towle's two sons, Sir F. W. Towle, who was knighted last year. and Mr. A. E. Towle, C.B.E., entered the Midland service in 1896, and two years later became assistant managers. In 1911 they were appointed as joint managers with their father, taking over full control on the latter's retirement in 1914. The new knight was a prominent member of the Central Control Board formed to deal

SIR WILLIAM TOWLE,
Manager of the Midland Railway Hotels, 1871–1914.

with the liquor problem in the munitions, transport and camp areas, under the Defence of the Realm Act, and did much valuable work during the years of the war.

* * *

LIEUT.-COLONEL C. J. H. W. FRANCIS, C.B.E., R.E., has been appointed Chief Storekeeper and Purchasing Agent to the London and South Western Railway. Born in 1879 Colonel Francis served his time on the London and North Western Railway at Crewe. He eventually became Chief Assistant to Sir A. L. Webb, K.C.M.G., in London, being responsible for all supplies for the Egyptian State Railways and other Egyptian Government Departments. During the war he was largely responsible for the development of the "Mystery Port of Richborough"

LT.-COL. C. J. H. W. FRANCIS,
Chief Storekeeper and Purchasing Agent, London & South Western Railway.

and the Water Transport in Mesopotamia. He took up his duties at Nine Elms on January 1.

* * *

MR. J. M. COOPER, Outdoor Assistant to the General Manager of the Glasgow & South Western Railway, has received an appointment in the Traffic Department of the Peruvian Corporation Railways. He has been in the service of the Glasgow & South Western Railway for a period of 17 years, during which time he has passed through practically every department and has acquired a knowledge of railway working which eminently fits him for the position to which he has now been appointed in South America. The good wishes of Mr. Cooper's many friends go with him in his new venture, and the fact that the occasion of his leaving the service has been marked in a tangible manner by the various departments with which he has been connected, bears eloquent testimony to the great esteem in which he is held by his former colleagues.

Digitized by Google

Among the gifts presented to him are a handsome leather suit case from the staff in the General Manager's office, a gold wristlet watch (suitably inscribed), together with a pearl and diamond scarf pin, gold dress studs and travelling rug from the members of the Glasgow & South Western Ramblers' Association, and a gold match-box and silver card case from the Locomotive Superintendent and Running and Mileage Departments. Mr. John M. Cooper is the son of the General Manager of the Glasgow & South Western Railway.

* * *

MR. A. S. BUSWELL, Chief of the Rates and Fares Section of the Superintendent's Department, Great Central Railway, has from January 1, 1920, been appointed Assistant Traffic Manager (Operating) for the Southern Division of the Great Central Railway in succession to Mr. S. E. Fay. Mr. Buswell, who was born in 1885, was educated at Newton's Grammar School, Leicester, and joined the Great Central Railway service as an Assistant Clerk in the office of the District Engineer at Leicester in 1900. He was appointed to the higher grade staff in 1910, and on completing his course of training in July, 1914, became Assistant to the Chief of the Rates and Fares Section in the Superintendent's Department. On Mr. H. Hunt leaving the Great Central service to take up the position of General Manager of the Londonderry and Lough Swilly Railway, Mr. Buswell succeeded him. He was Chairman of the Passenger Train Rates and Fares Conference at the Clearing House during 1919.

* * *

SIR ALBERT STANLEY, M.P. (now Lord Ashfield), presided at the New Year gathering of employees in the Underground and allied companies on January 5, at the Central Hall, Westminster. Amongst the directors present were Lord George Hamilton, Lord Farrer, Lord Stuart Wortley, Viscount Knutsford, Sir Alexander Roger, Mr. H. A. Vernet, Mr. James Devonshire, Mr. Murray Griffith, Mr. E. R. Soames, and Mr. T. C. Jenkin. The officers present included; Mr. H. E. Blain, Operating Manager; Mr. J. P. Thomas, Assistant Operating Manager; Mr. Frank Pick, Commercial Manager; Mr. Z. E. Knapp, Manager for Maintenance, Railways; Mr. G. J. Shave, Manager for Maintenance, Omnibuses; Mr. J. B. Lindsay, Assistant Secretary; Mr. S. J. Webb, Passenger Agent; Mr. A. R. Cooper, Engineer; Mr. W. A. Agnew, Mechanical Engineer. The gathering took the form of a high-class concert, every item of which was fully appreciated, and there were numerous encores. During an interval Sir Albert Stanley made a short speech expressing his pleasure at being present and his thanks for the services of his associates in the Underground and allied companies. They now had a gross revenue of at least £1,000,000 a month, and a weekly pay-bill of £130,000. When he first joined the directorate they carried 300,000 passengers a day, but now they were carrying 4,000,000 passengers a day. If the number of passengers carried were measured in miles to-day it would be equivalent to a distance of 20 times round the earth every 24 hours. Notwithstanding their stupendous volume of traffic they had not enough money at the end of the week to meet all the expenses necessary for carrying on their great undertakings. But he could say they were all doing their best to carry on and provide an efficient service for the people of London. If there were any profiteering at all it was the passengers who were riding on their undertaking and securing from them a transport service which, from point of view of cost, was much greater than the fare which they had to pay for it. He thought he could rely on the good sense and fairness of the public to see that in return for the services they were giving they had a fair return.

* * *

AT the gathering recorded in the previous paragraph Sir Albert Stanley said he had taken the liberty of sending the following message to his Majesty the King: "This reunion of employees of the Underground and allied companies now gathered at the Central Hall, Westminster, and representing 35,000 members of the staff, wish to tender His Majesty the King an expression of their loyalty to the Throne, and to say that the spirit which inspired 16,000 members of the staff to bear arms in the late war still inspires them in the great work of reconstructing the transport facilites of the Empire's capital." During the evening the following message was received in reply: "The King has received with much pleasure the loyal greetings from the members of the staff of the Underground and allied companies which you have addressed to His Majesty. The King gratefully recognises the splendid work of the men and women connected with these companies both in the field and at home during the great war. In thanking them for their message the King appreciates the efforts of those who over and underground endeavour to ensure to London and its suburbs a transport service worthy of the centre of a great Empire."

* * *

A MEMORABLE gathering took place at the Clifton Hotel, Blackpool, when the officials

Digitized by Google

and staff of the Superintendent of the Line of the Lancashire and Yorkshire Railway, met on the occasion of their Annual Dinner after an absence of six years. Upwards of 120 sat down to a splendid repast, and a most enjoyable evening was afterwards spent, the members being entertained by a number of excellent artists. The various items were interspersed with speeches and toasts, and in the course of his remarks the Superintendent of the Line, Mr. Ashton Davies, M.B.E., expressed the view that the future promised better conditions for railway workers. The toast of "Our Guests" was ably proposed by Mr. T. W. Royle, M.B.E., Assistant Superintendent of the Line.

* * *

THE Military Forwarding Services Old Comrades Association (President: Major C. L. Macdona, O.B.E., late M.F.O., British Expeditionary Force) has now been established, and it is hoped that the corporate friendship, which was characteristic of the Military Forwarding Services during the war, might be continued. The annual subscription is one shilling, and anyone who served with the Military Forwarding Services in any theatre of war is eligible for membership. The Hon. Joint Secretary and Treasurer, Mr. Frank Gilbert, 51, Lime Grove, London, W. 12, will be pleased to enrol new members and give full particulars to interested enquirers. Many RAILWAY MAGAZINE readers will remember the illustrated article, by Mr. Gilbert, in August, 1919, entitled "The Work of the Military Forwarding Department with the B.E.F."

* * *

THE Right Hon. Sir Eric Geddes, G.C.B., G.B.E., M.P., Minister of Transport, having accepted the office of President of the Institute of Transport, and a Council having been formed of personages prominent in traffic and transportation circles, applications for membership will now be entertained. The necessary forms can be obtained from Mr. H. E. Blain, Hon. Secretary (*pro tem.*), at the temporary offices of the Institute, 2 and 3, The Sanctuary, Westminster, London, S.W. 1.

* * *

UNDER the presidency of Mr. W. Parker, the thirteenth annual dinner of the Railway Club has been held at the Holborn Restaurant, London, when a large company partook of an excellent repast. As on previous occasions, the musical programme was under the able direction of Mr. Basil M. Bazley, and it was thoroughly enjoyed. The toast of "The Railway Club" was proposed by the President, and the other after-dinner speakers were Messrs. K. Ffitch, Edwin J. Miller, H. M. D. Meacock, N. B. Foster, Basil M. Bazley, and the Rev. A. Cunningham Burley. All acquitted themselves well, but Mr. Burley was in a particularly happy vein, and added considerably to the reputation he had already achieved for post-prandial oratory.

* * *

THERE was a large gathering at the Railway Club, 92, Victoria Street, S.W. 1, on Tuesday, February 13, when Mr. J. F. Gairns presented his paper, "The Suburban Traffic Problem." Mr. Gairns confined his suggestions largely to improvement of existing conditions with materials and methods ready to hand rather than to Utopian schemes for the distant future. At the close he was cordially thanked by Mr. W. Parker, who presided, and by the various members who participated in the ensuing debate. During the business proceedings that prefaced Mr. Gairns' paper, five new members were elected; it was announced that the Committee had selected Mr. F. M. Gates as Assistant Hon. Secretary of the Club, and that the annual general meeting is to be held at headquarters on Tuesday, February 10, at 6.45 p.m.

* * *

RAILWAY MAGAZINE readers who wish to secure for framing unfolded copies of the colour plate of Great Western Railway locomotive, No. 111, *The Great Bear*, will be well advised not to delay too long their orders. It is proving one of the most successful "best-sellers" ever produced by THE RAILWAY MAGAZINE. The photograph used in the production of the original oil painting was from the camera of Mr. A. B. MacLeod.

* * *

SEVERAL readers have written to point out that Mr. Cecil J. Allen, in his article in the January RAILWAY MAGAZINE on "British Locomotive Practice and Performance," was not correct in describing the 20 4-6-0 locomotives now building by Messrs. Beardmore for the Great Eastern Railway as the first engines purchased by that company from outside builders since 1874. Referring the matter to Mr. Allen, we have received a reply as follows:—"Your readers are quite correct in their contention. I was misled as regards the date in question by a contemporary, but on looking into the subject I find that numbers of further engines were built outside for the Great Eastern Railway, culminating in the second batch of the famous Bromley 'singles'—Nos. 600-609 (4-2-2 type)—supplied by Messrs. Kitson and Co. in 1881-2. With the succession of Mr. T. W. Worsdell to the superintendence of the locomotive department, however, outside building ceased, and has remained in abeyance until the present date."

Digitized by Google

FOR the current year an excellently-produced calendar has been issued from the Press Bureau of the London Underground Railways. Each month is provided with an appropriate illustration, beginning with football in January and ending with Christmas shopping in December. For either business or recreation the underground electric railways, with the allied omnibus services and tramways, furnish the necessary transport for millions of Londoners and visitors to the Metropolis. The vast crowds depicted in the photographs that illustrate the calendar convey some idea of the magnitude of the task so admirably shouldered day by day by the authorities at Electric Railway House, Westminster.

* * *

AN electric system of signalling has been successfully inaugurated at Victoria Station on the South Eastern and Chatham Railway. The most novel feature of the system is the adaptation of what is known as three-position signalling. The horizontal position and the red light stand as usual for "danger," but the signal moves upward to starting position showing an amber light to indicate "clear to next signal." This is known to railwaymen as the 45 deg. position For the signal "all clear," the arm moves into a vertical position showing a green light. The points and signals are worked by electricity.

* * *

A NEW Army Council instruction lays down a number of rules for economising Army traffic on railways in consequence of the continued and acute shortage of railway wagons throughout Great Britain, which is considered by competent authorities to be greater than was experienced by the British Army in France during 1918. It is stated that where terminal cartage is involved, railways are not to be used for distances under 10 miles, while even for distances over 10 miles War Department or hired road transport should be used wherever possible. Again, wagons must be loaded or unloaded as soon after arrival as possible, and the local railway authorities should immediately be notified when wagons are ready to move. By these and similar means the situation as regards Army traffic will be relieved, and the provision of an early programme of wagon requirements in order of priority for all essential War Department traffic to the railway companies will enable reference to be made to the War Office with a view to a decision being arrived at in individual cases where railway companies assert their inability to meet demands.

OUR Crewe correspondent, Mr. C. Williams, writes :—

I append a list of the 42 six-wheeled coal engines which are not yet returned from overseas, viz. :—Nos. 17, 153, 198, 354, 778, 1099, 1179, 1316, 1339, 1349, 2047, 2050, 2171 2255, 2371, 2381, 2383, 2436, 2448, 3053, 3105, 3109, 3119, 3151, 3209, 3231, 3271, 3320, 3325, 3339, 3353, 3356, 3387, 3414, 3415, 3418–23, and 3448. Two of the four-cylindered "Claughton" class locomotives are now stationed at Longsight. They are Nos. 250 *J. A. Bright*, and 2042 (no name), and are the first engines of the class to be located there. Of a new series of 4–6–0 "Prince of Wales" class locomotives, Nos. 56, 67, and 686 are in service and are stationed at Crewe. They have appeared without the usual number-plates, due to the moulders' strike, and for the time being the numbers are chalked on the side-panels. No. 1932, *Anson*, is the latest compound passenger engine to be rebuilt as a two-cylinder simple "Renown" class.

* * *

SEVERAL of the Great Western Railway 0–6–0 saddle or pannier tanks engaged in shunting at the much-criticised army store "dumps" at Didcot and Slough have been fitted with conical spark arresters. This gives them an appearance very similar to the older types of wood-burning locomotives on some Russian and American railways.

* * *

THE Bath City Council has agreed to suggest to the Great Western Railway the early re-opening of the passenger station at Twerton, a working-class suburb a mile west of the city. A further recommendation urges the provision of a new station in a more central spot in view of the great growth of Twerton towards Bath during the past 50 years. Suggestions have also been made for the development of suburban traffic on the Somerset and Dorset Joint Railway, which on approaching Bath encircles the south-western suburbs in a horseshoe curve.

* * *

FOR the benefit of RAILWAY MAGAZINE readers interested in model engineering we are asked by Vernon Smith & Sons, Limited, 117, High Road, Chiswick, W.4, to announce that the firm have secured a further stock of scale model locomotives, including a number of pre-war manufactured stock, quite new and unused. Likewise, the firm is arranging with a retired railway consulting engineer to advise them in connection with manufacturing model locomotives.

Digitized by Google

Railway Literature.

THE RAILWAY ENGINEER. The St. Margaret's Technical Press, Limited, Queen Anne's Chambers, Westminster, S.W.1. Price 1s. monthly. Beginning with the issue for January, 1920, this old-established monthly publication has been considerably enlarged and improved. Profusely illustrated and particularly readable the January number is ample evidence of a determination on the part of its producers to furnish railway engineers and all others concerned in the design, construction and maintenance of bridges and structures, permanent-way, locomotives, rolling-stock, electric traction, signalling and railway works equipment, with a technical periodical highly distinguished in excellence.

Crisply written personal paragraphs are followed by well-considered editorials dealing with such subjects as co-operation in maintenance and renewal working tendencies in locomotive design, the signalling outlook and so forth. Students of railway engineering and engineers who have regard for the value of a well-stocked library will appreciate the informative, although brief, reviews of recent publications that have reference to questions affecting the profession, while the section of the "Railway Engineer" devoted to recent patent rights relating to railways will help to make easy the way of the inventor, which is notoriously hard.

The illustrated articles are as varied as they are valuable, the subjects being :—

Railway Construction in Uganda.

Modern Locomotive Design and Construction.

Melbourne Railway Electrification.

Labour-Saving Devices for Railway Track Work.

Tunnels.

New Locomotives for South African Railways.

Machine Shop at Harwich Locomotive Works.

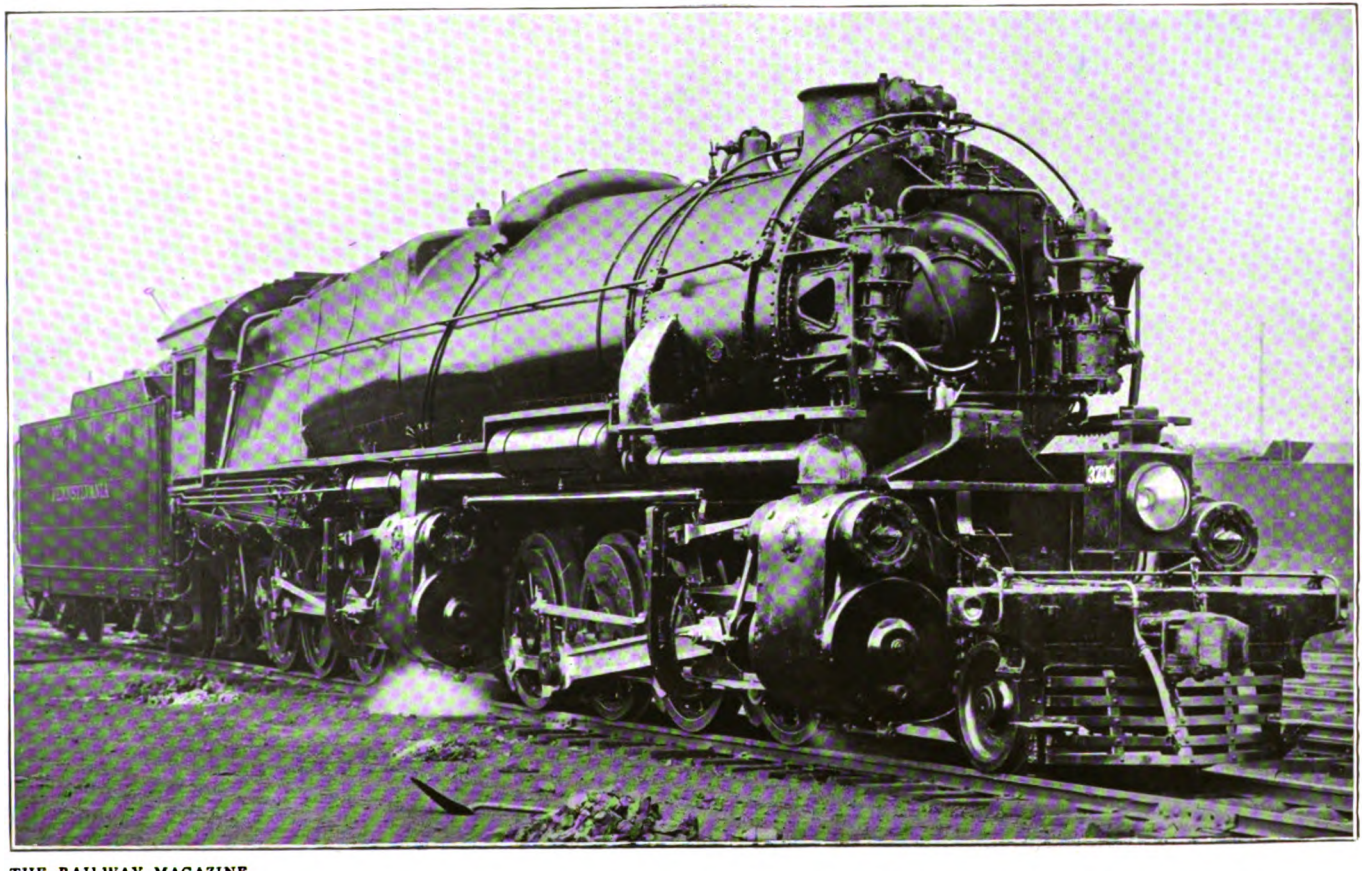
In conclusion it must be admitted that "The Railway Engineer," in its new, improved and modernised guise is a very presentable production, and one does not need to be a prophet, nor the son of a prophet, to be able to predict that if the superior quality of the issue under notice is maintained in future months, the result will be commensurate with the skill and experience that has been expended in the preparation of the January number.

CANADIAN PACIFIC RAILWAY BUDGET.—We have received from Sir George McLaren Brown, European Manager of the Canadian Pacific Railway, a copy of this publication. It is well produced, with many appropriate illustrations, and opens with a Christmas greeting from Sir George to Canadian Pacific Railway agents. A full-page portrait of the Hon. Sir George H. Perley, K.C.M.G., High Commissioner for Canada, faces extracts from an address recently delivered by Mr. E. W. Beatty, President of the Canadian Pacific Railway, dealing with the Province of Quebec and Canadian railway problems. A fine portrait of Mr. Beatty is also reproduced, while portraits of Mr. John Howard, Agent-General for Nova Scotia; the Hon. Lieut.-Colonel Pelletier, Agent-General for Quebec; Brig.-General R. Manley Sims, Agent-General for Ontario; the Hon. F. C. Wade, Agent-General for British Columbia; Lieut.-Colonel J. Obed Smith, Superintendent of Emigration for Canada, accompany appropriate articles written by these well-known gentlemen. An interesting article by Mr. Keith Morris describes "The Romance of the Canadian Pacific Railway," while other articles deal appropriately with various aspects of Canadian life, with particular reference to Canadian Pacific Railway associations. A central supplement deals with the visit of H.R.H. the Prince of Wales to Canada. Another striking feature is a reproduction of the Canadian Pacific Railway Calendar for 1920 and of a series of very fine posters. On page 48 one of the latest 4–6–2 express locomotives is illustrated alongside a standard passenger engine of 1883. On page 62 an article is reproduced describing the "Trans-Canada Limited" express. There are also numerous other contributions and illustrations which render the *Canadian Pacific Railway Budget* well worthy of preservation for reference.

AGRICULTURAL AND INDUSTRIAL PROGRESS IN CANADA.—Published in Montreal by the Canadian Pacific Railway Department of Colonisation and Development. The first number of this new monthly includes a brief review of Canadian progress during the past fifty years, and then deals with various aspects of Canadian industry and agriculture. It takes the place of the bulletin, *Western Canada Week by Week and Business and Industrial Opportunities in Western Canada*, previously issued.

Digitized by Google

Digitized by Google

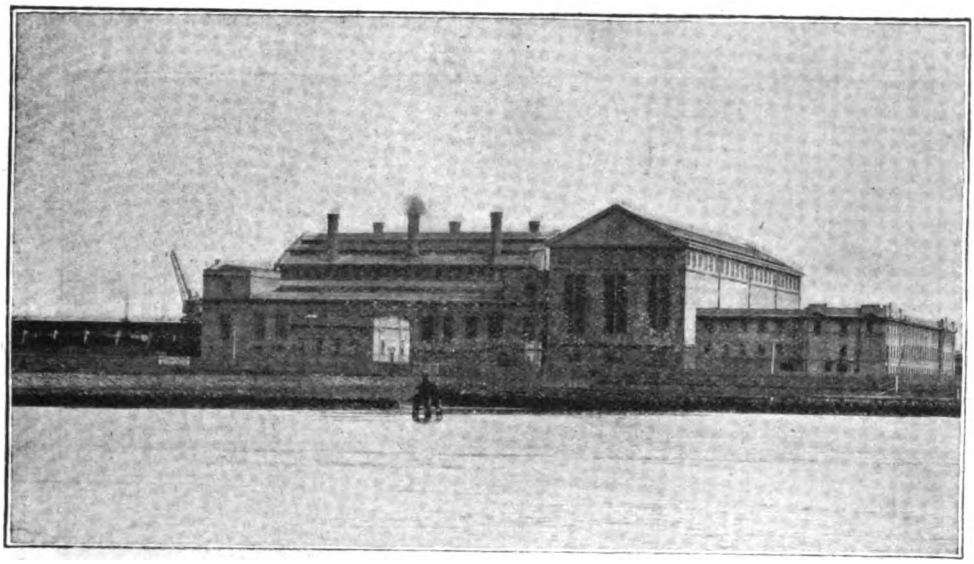


THE RAILWAY MAGAZINE.

PENNSYLVANIA RAILROAD 2-8-8-0 SIMPLE ARTICULATED LOCOMOTIVE.

Weight of engine and tender in working order: 355 tons.

Digitized by Google



NEWPORT POWER HOUSE, FROM THE RIVER YARRA.

Suburban Electric Traction in Australia.

EQUIPMENT OF MELBOURNE SUBURBAN LINES: VICTORIAN GOVERNMENT RAILWAYS.

BOTH Melbourne and Sydney provide extensive areas and many routes where suburban traffic upon an enormous scale has to be conducted by the respective Government railway systems. In the former case routes totalling over 300 miles are involved, while the traffic dealt with at the two principal stations, Flinders Street and Spencer Street, is so great that the question of electrification has been under consideration for many years, dating back, in fact, as far as 1896, though concrete proposals did not mature until 1907. At Flinders Street there are 14 platforms, of which the majority are through, so that trains from Spencer Street via the four-track connecting viaduct can serve both stations. At Spencer Street there are eight terminal platforms and an island for through trains. In practice a majority of the trains terminate at one or the other according to the direction of approach, though there is a heavy traffic over the connecting viaduct.

Such a system of lines, whereon over 100,000,000 passengers are conveyed annually, provides an admirable field for electrification, and now that electrical working is in full operation on certain sections, a detailed description of the equipment will be of interest, not only as the first in Australia, but also in view of the magnitude of the undertaking. Before dealing in detail with the plant and equipment a few remarks concerning the character of the traffic and the history of electrification proposals will be in order.

Total track mileage of the Victorian railways is some 4,300, of which over 300 miles are suburban lines serving the city of Melbourne. The importance of the Melbourne suburban traffic to the whole system is shown by the fact that it accounts for some two-fifths of the total train mileage of the railways entering the city. Not only are the suburban railways of greater importance to the system as a whole than in other countries, but they are of greater importance to the city itself than are the suburban systems of

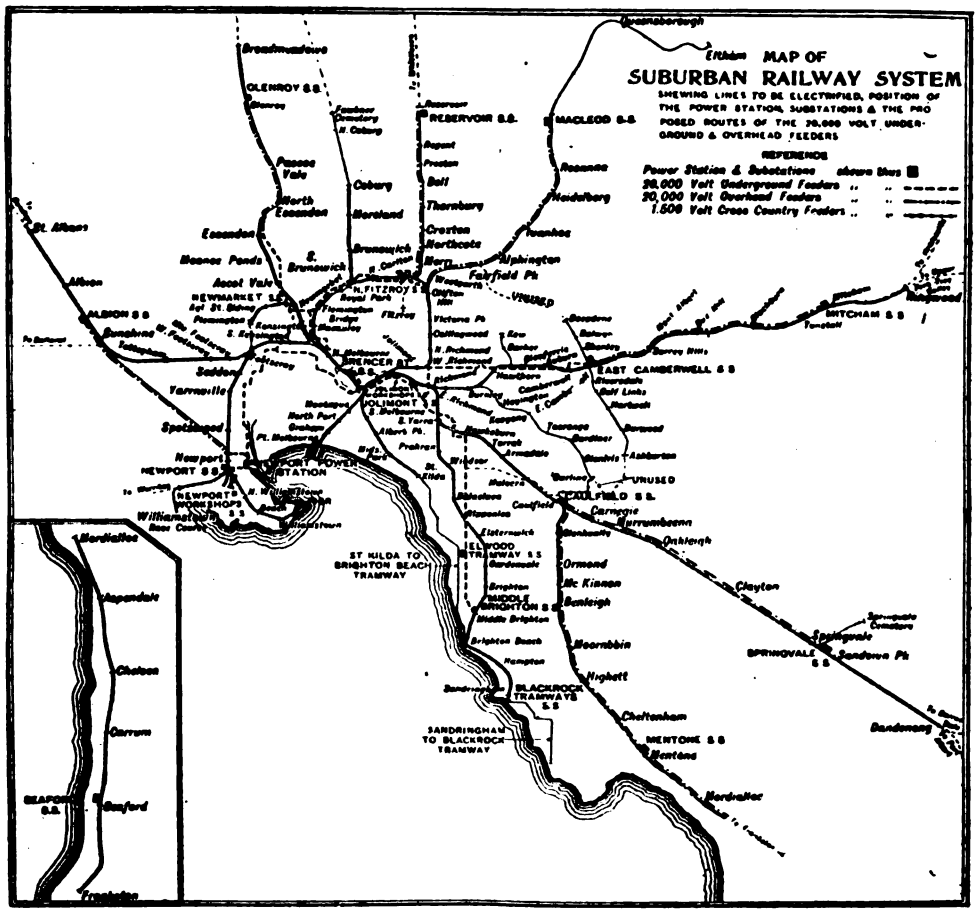
Digitized by Google

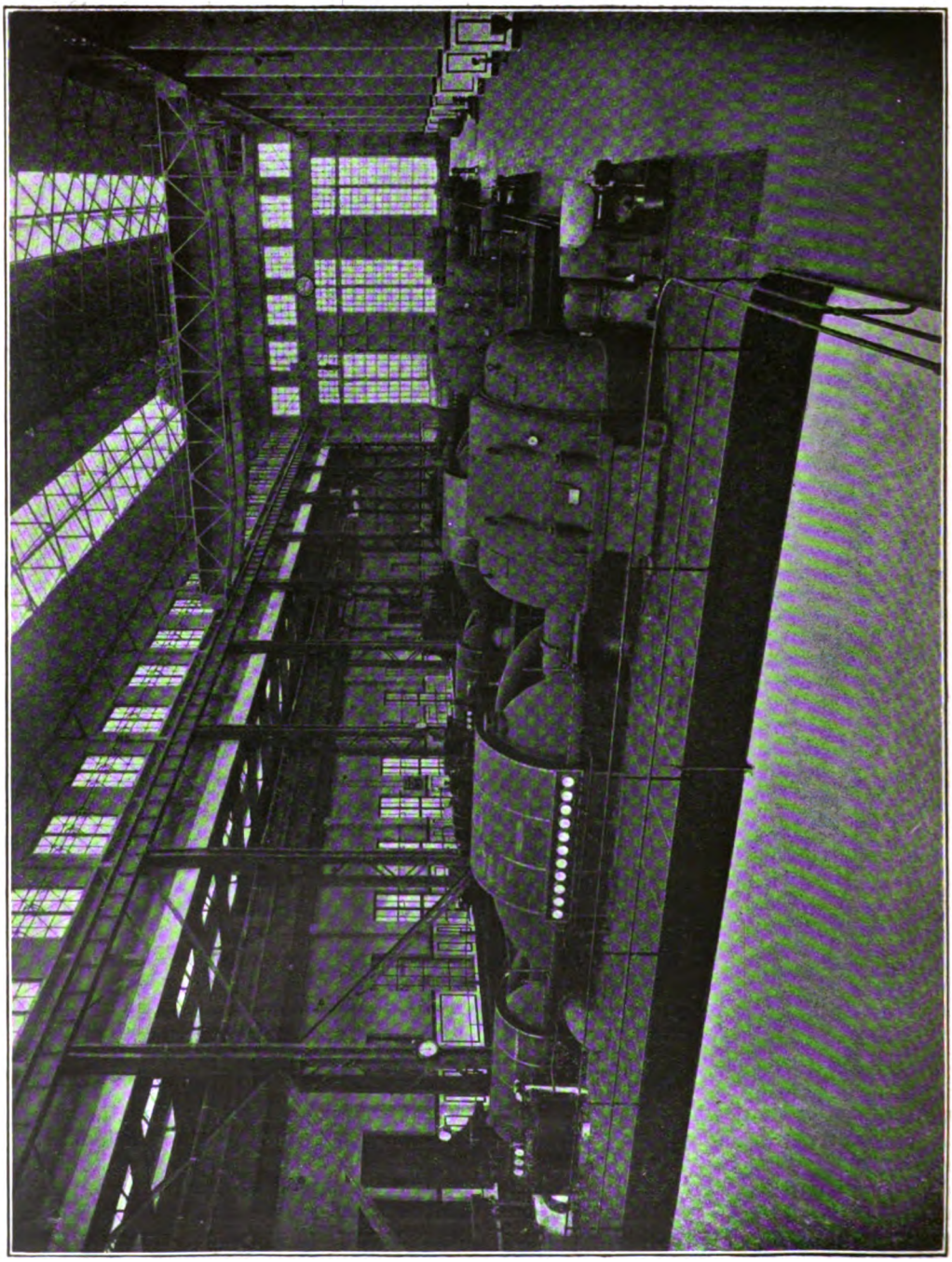
SIX-CAR TRAIN, SLIDING DOOR TYPE, AS USED FOR MELBOURNE ELECTRIC SERVICES.

Digitized by Google

most other cities. Owing largely to the foresight of the authorities responsible for laying out the city the density of population is only about one-fifth of that commonly found in this country. The result is that the suburban railways cover an unusually large area in spite of there being an excellent cable tramway, and deal with a large amount of traffic which, in other cities, is dealt with by electric tramways or inter-urban railroads, or motor omnibuses. The service given was always an exceptionally good one, in fact, as good as any steam suburban service with which we are acquainted. The longest route concerned in the electrification scheme extends 26 miles from the city.

Electrification of the suburban system was first proposed in 1896 by the General Electric Company, U.S.A., who proposed to instal three 225-kw. "tramway dynamos" to work certain of the lines. The matter was considered by Select Committees in 1898 and again in 1901, but nothing was done until 1907, when Mr. (now Sir) Thomas Tait, Chairman of the Commissioners, submitted a report on his tour in Europe and America, and engaged Mr. Charles H. Merz, M.Inst.C.E., as consulting engineer. After visiting Melbourne, Mr. Merz, in 1908, presented an exhaustive report on the whole matter. This report showed that there would be a large saving in operating expenses, but that if no increase of traffic followed, there would, after meeting capital charges, be a net loss of £76,000 in the first year, and an increasing profit thereafter. An


MAP OF
SUBURBAN RAILWAY SYSTEM
SHEWING LINES TO BE ELECTRIFIED, POSITION OF THE POWER STATION, SUBSTATIONS & THE PROPOSED ROUTES OF THE 20,000 VOLT UNDERGROUND & OVERHEAD FEEDERS
REFERENCE
Power Station & Substations shewn thus
20,000 Volt Underground Feeders
20,000 Volt Overhead Feeders
1,500 Volt Cross Country Feeders
Broadmeadows
OLENROY S.B.
RESERVOIR S.B.
MACLEOD S.B.
Essendon
Moonee Ponds
Ascot Vale
NEWMARKET S.B.
Coburg
Brunswick
Thornbury
Northcote
Alphington
Fairfield Pk
Footscray
Sunshine
Sydenham
Sydenham
Sydenham



NEWPORT POWER HOUSE, MELBOURNE.
Turbine Room containing Four 10,000-k.w. sets.

Digitized by Google

increase in traffic more than sufficient for this purpose was anticipated by Mr. Merz, but it was decided not then to proceed with the electrification. By 1912, however, the traffic had increased very much more than had been estimated and sufficiently to necessitate either expensive track widenings, or, alternatively, to justify the capital expenditure involved in electrification, even if this produced no additional traffic.

At the request of the Hon. W. A. Watt, then Premier of the State of Victoria, a further report was presented by Messrs. Merz & McLellan, based upon actual tenders from manufacturers. Alternative prices were obtained for the single-phase and direct-current systems. The latter proved to be substantially cheaper, both in capital expenditure and operation. The direct-current scheme was found to mean £707,000 less capital outlay, and £70,000 a year less operating expenses. Contracts were, therefore, placed providing for the conversion of the whole of the suburban lines on the high-tension direct-current system, the work to be carried out in three stages. With the exception of the coach equipments, all the contracts have been executed by British or Australian firms with the stipulation that manufacture for the British contracts was to be carried out in this country. The coach equipments were ordered in America with the special condition that some of the motors were to be made in England.

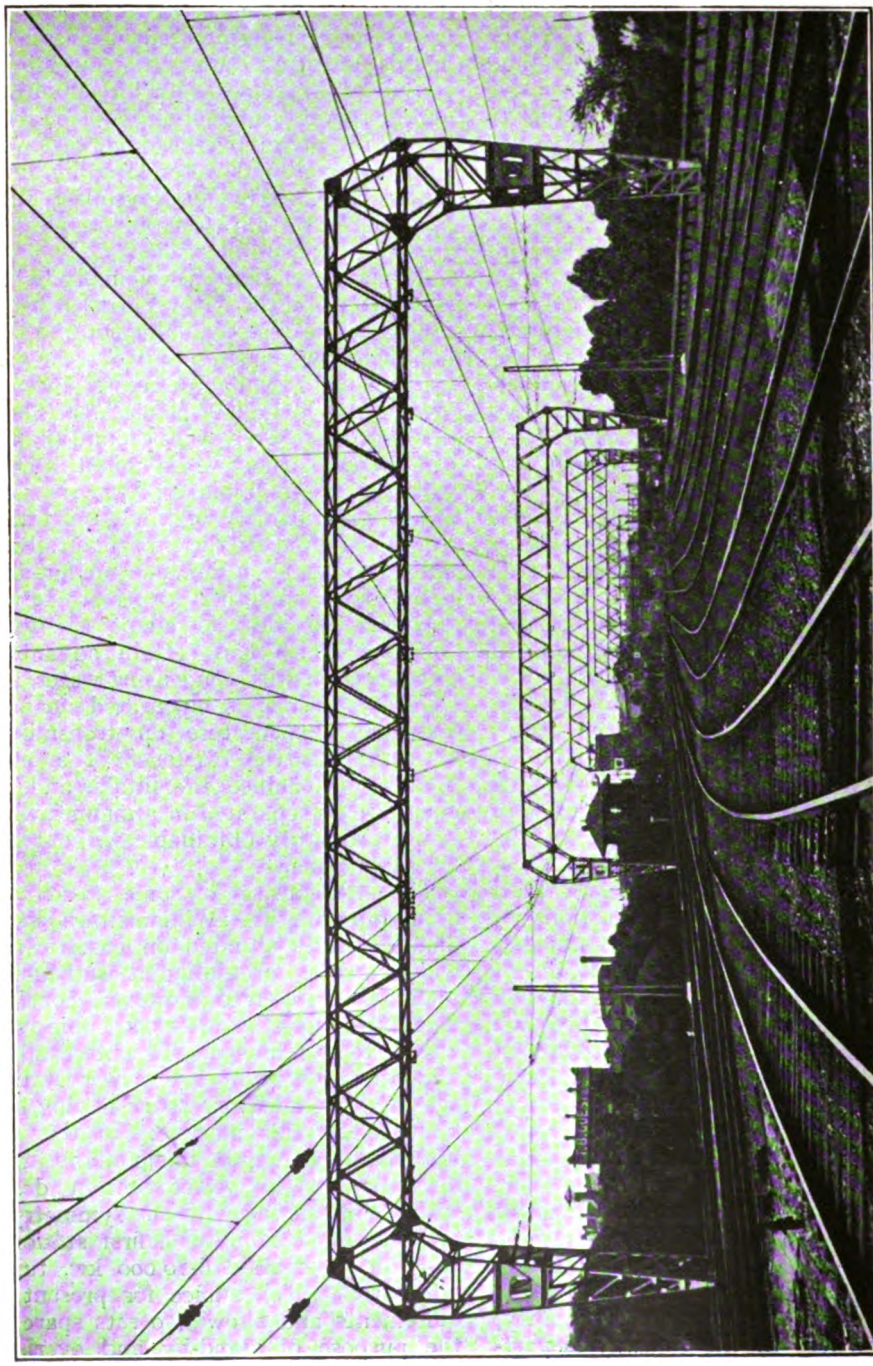
The whole of the work has been carried out to the plans and specifications of Messrs. Merz & McLellan, of Westminster, and their local representative, Mr. E. P. Grove, assisted by a special Electrification Committee, consisting of the late Mr. E. B. Jones, Railway Commissioner, Chairman, Mr. W. M. Shannon, Railway Commissioner and late Chief Mechanical Engineer, Mr. W. Stone, Chief Electrical Engineer, Mr. W. R. Rennick, Assistant Chief Engineer, Ways and Works, Mr. T. B. Molomby, General Superintendent of Transportation, with Mr. W. D. Bracher as Secretary. The death of Mr. Jones before the completion of the work, the success of which owed so much to his ability, is a serious loss to the Railway Department.

The scheme is one of the largest and most important electrification schemes as yet carried out. The leading engineering features are the production of electric power, at 3,300 volts between phases, by means of three-phase, 25-cycle, turbine-driven alternators, raised to 20,000 volts by static transformers; its transmission at this pressure to sub-stations where it is converted to 1,500 volts direct current, and at this pressure supplied to the trains by means of an overhead contact wire. The main contracts were placed in March, 1913; work started in November, 1913; and the first train was run on May 29, 1919.

The power station was originally to have been placed on the River Yarra, at Yarraville, the nearest available site to Melbourne having a good supply of condensing water and reasonable access by rail. While the detailed plans were being developed, however, it was found that the prospective harbour works might interfere with the existing course of the river and reduce the quantity of condensing water to that required for the suburban railways only, leaving no future margin for additional power for other purposes. It was, therefore, decided to adopt a site at Newport which had certain advantages in connection with condensing water, subsoil, &c., which compensated for the additional expenditure on transmission cables. Thus the existence of a stone breakwater enabled the intake and discharge to be separated in a manner which is not ordinarily obtainable without considerable expense.

The site consists of some 36 acres of land adjoining the Williamstown Ferry, and is mostly situated on basaltic rock which, while providing a satisfactory foundation, involved, however, considerable extra work, some 45,000 cubic yards having to be removed. The site has been laid out to contain two power stations side by side, adequate space having been reserved for this purpose. In this way full advantage may be taken of any future developments in power station design without interfering with the symmetry of the present station. The first station is laid out to contain 6-10,000 kw. turbo-alternators which suffice for present requirements and allow two sets spare for the purpose of stand-by and overhaul. The two boiler houses are at right angles to the engine room, each being provided with its own coal store and coal handling machinery.

Digitized by Google



PIN ARCH STRUCTURES AT NORTH MELBOURNE JUNCTION (FIRST STRUCTURE 120-FT. SPAN), FOR CARRYING OVERHEAD CONDUCTORS.

Digitized by Google

Design of the power station is a compromise between the purely architectural and the inartistic nature of a building for containing machinery pure and simple, but the result is distinctly pleasing. Between the two boiler houses is a space occupied by a general purposes building containing stores, water storage tanks, workmen's accommodation, laboratories, test tanks, &c. Placing these accessories in this position is not only satisfactory from the architectural point of view, but has proved efficient as regards administration and working. The separation of the engine room from the boiler house by a lower pump room has a good effect, and the low symmetrically-arranged chimneys are not an eyesore. Each prime mover is treated as far as possible as an independent unit, each turbo-generator, for example, having its own transformers, stepping up to 20,000 volts. The turbines are of the Parsons pure reaction type with divided cylinders, and the boilers are of the Babcock & Wilcox marine type. The Michell type thrust bearing—an Australian invention—is used.

Water supply to the pumps is in duplicate, and the central situation of the circulating pumps is a novel and convenient feature of the design. The boiler house has a suction ash plant, which also deals with the soot from the economisers, while the mechanical coal-handling arrangements permit of the fuel which is delivered in railway trucks being deposited in the overhead bunkers of the boilers, or in the coal store, or being taken from the stores and delivered to the bunkers, no manual labour being employed. An important feature is the switch house. This is parallel with the engine room but some distance from it, there being no attempt to provide communication between the switch house and the engine-room staff except by telephone and telegraph.

The power station bus-bars are divided into two sections, each sub-station being fed from both sections. Mechanical interlocking is provided as well as other elaborate safety precautions. One side of each switch cell is open to the outside air in case of an explosion after an unusually heavy short-circuit. The control room is situated at the end of the switch house, and here is centred not only the control of the main power station plant and transmission feeders, but all electrical operations throughout the entire transmission and conversion system also.

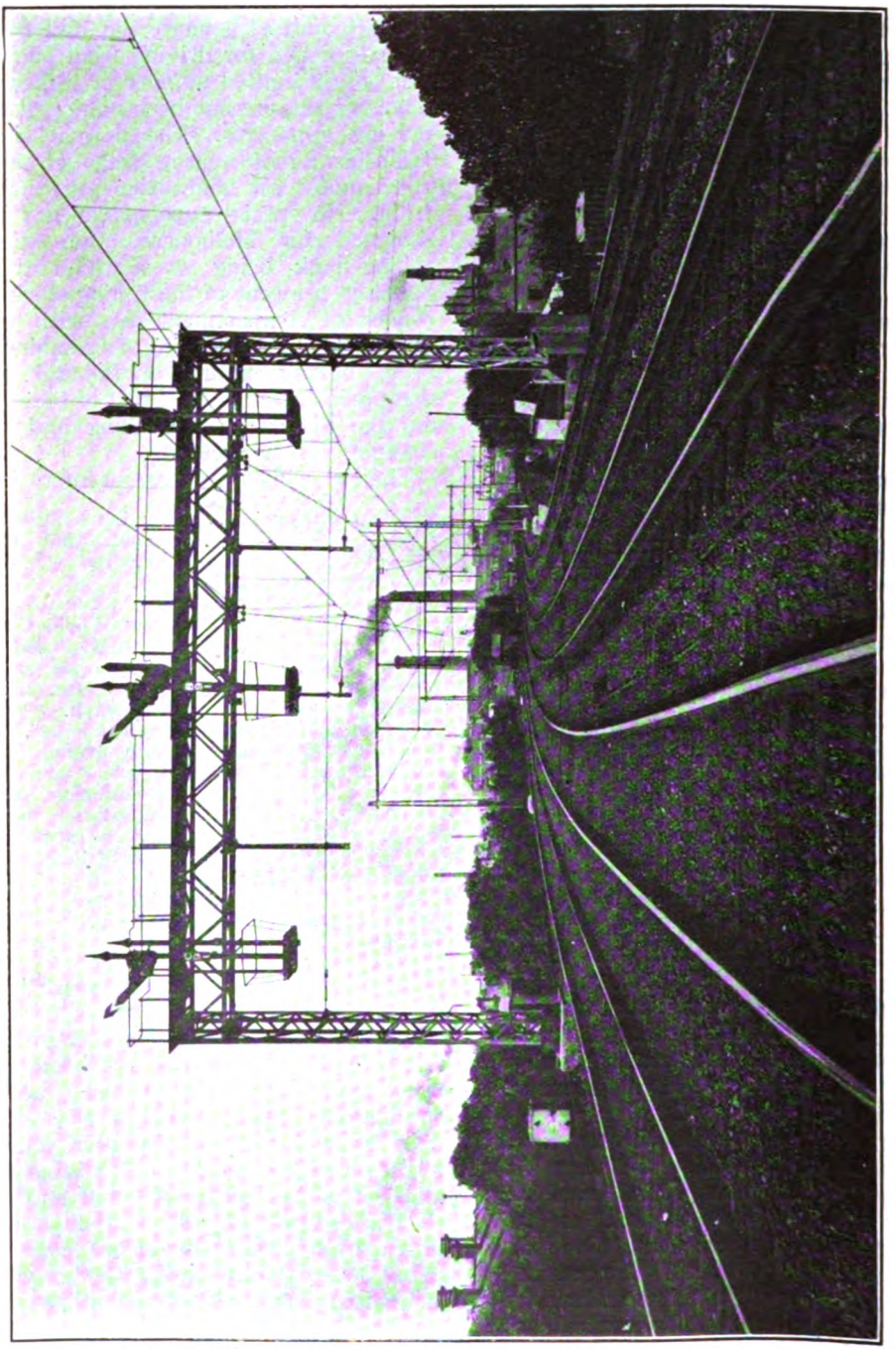
Trains are operated on the "multiple unit" system. It was intended to make up each unit of a motor car and trailer, both equipped for driving from one end, but only a limited number of trailer cars have for the present been equipped with driving apparatus. The normal six-car train has a motor car at each end, with a third motor car about the centre of the train. No special type of car has been designed for Melbourne, the existing rolling-stock being as a rule utilised. Some 45 per cent of the rolling-stock will consist of compartment cars with swing doors, the remainder being of a combination type, having sliding doors and cross seats, with a corridor. Most of these cars are partitioned into smoking and non-smoking compartments.

The following details are of interest :—

Make up of train ..	Equal number of motor and trailer coaches.
Motors per motor coach	Four.
System of control ..	Full automatic with tapped field. Control current obtained from 1,500-750 volt dynamotor.
Method of collection ..	Pantograph.
Weight of motor coach	47 tons average.
Weight of trailer coach	27 tons average.
Gauge of track ..	5 ft. 3 in. Coaches and equipments are designed so that it can be reduced to 4 ft. 8½ in. in future.
Diameter of driving wheels	42 in. (new)
One hour rating of motor	140 b.h.p.
Gearing	74-23.

As no new swing door cars are being constructed for the electric lines, the bodies of the existing cars are being transferred to new underframes and bogies of a type uniform with those used in the sliding door cars. Some of the sliding door trailer cars have also been running in the steam service, but new sliding door motor cars are being constructed for the electric service. One illustration shows a six-car train of the sliding door type. The swing door cars are similar to those used on British railways. The sliding door cars have a centre passage-way throughout, but no vestibule, so that it is not possible for passengers to pass from one car to another. Body framing of the new cars is of teak, but Australian woods have

Digitized by Google



FOUR-TRACK STRUCTURE ON CURVED TRACK FOR CARRYING OVERHEAD CONDUCTORS AND THREE-POSITION SIGNALS.

Digitized by Google

been used wherever possible, the interior being finished in Queensland maple. Seats in the first-class cars are covered with green Australian leather; those in the second-class with brown duck cushions. The whole of the rolling-stock has been built in the State railway workshops at Newport.

Each motor car has four motors of 140 h.p., the gear ratio being so proportioned that the maximum speed will be 52 m.p.h. on level tangent track. They are of the G.E. 237 type normally for 750 volts. The master controller is of standard type, but as the actuation of the contactors is automatic the controller only has four points in the forward direction and two in the reverse direction, the first point in either direction being known as the "switching" or "lap point," and the second point being the "series" position. The air compressor, governor, emergency and trip valves are of the usual type

A pantograph is employed for collecting current, with a working range between 14 ft. 6 in. and 21 ft. 6 in., the running pressure being maintained by means of springs. The pantograph is put into and taken out of action by pistons and cylinders mounted on the frame of the collector. Air pressure for the initial operation of the pistons is supplied in the first instance by the hand pump installed in the guard's compartment. The motor pumps can then be started up and the subsequent air pressure obtained from the main brake reservoir. The pantograph is then controlled by means of two electro-pneumatic valves which can be operated electrically or by hand.

The Melbourne Suburban system consists of approximately 335 track-miles including sidings. Most of the routes are double track, but those from South Yarra to Caulfield, and North Melbourne to South Kensington, are four-track routes, while for three miles there is a six-track route. Normal permanent way construction is 100 lb. per yard T-section rail double spiked to untreated sleepers of hard wood, there being about 15 in. of bluestone ballast. The track gauge is 5 ft. 3 in. with 11 ft. 8 in. centres, while minimum structure clearance above platform level on tangent track is 7 ft. from track centre increased to 8 ft. on 12-chain curves. The minimum curve is 9 chains radius, while the maximum grade of any importance is one of 2 per cent. For 9 miles between North Melbourne and Broad Meadows the average grade is ·85 per cent., the maximum permissible speed on this section being 52 m.p.h. Practically all curves have a 150 ft. easement approach.

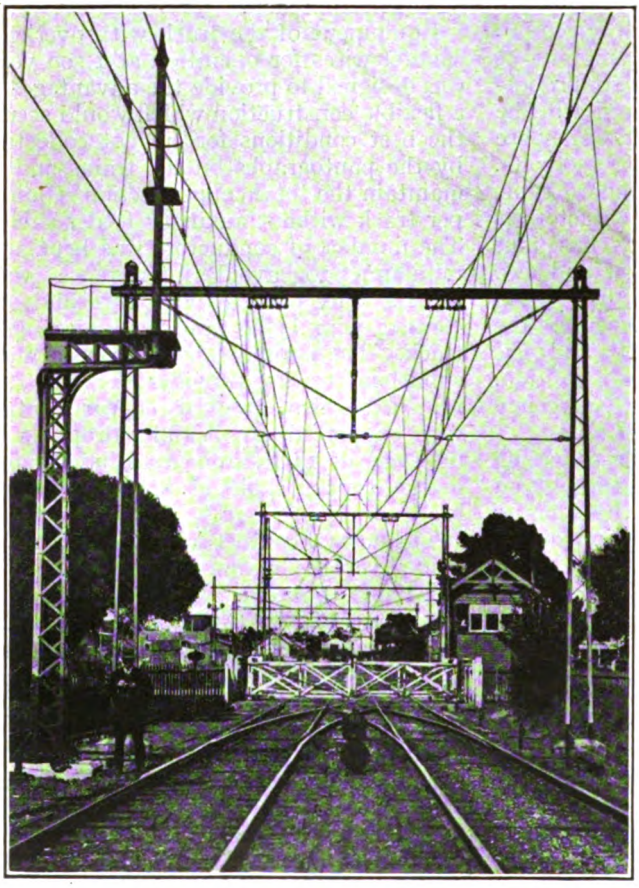
Equipment of the track with overhead contact wires for operation at 1,500 volts was designed to provide the advantages of a flexible construction which would secure the best conditions for current collection by the pantographs on the trains and to maintain the total copper section required per track without auxiliary feeder cables. The number of conductors was kept at a minimum to avoid interference with signals, only one catenary wire and one contact wire being employed over each track. The normal construction on main suburban tracks provides for ·25 sq. in. hard-drawn grooved copper contact wire supported by flexible droppers at intervals of 15 ft. from a stranded hard-drawn copper cable of ·25 or ·375 sq. in.

The normal contact wire height is 16 ft. 6 in. over the main suburban tracks at 70° Fahr., but over grade crossings the minimum height is 18 ft., while under low bridges, which are numerous, the minimum height is 14 ft. 6 in. above rail level, giving a vertical clearance of 12 in. between the contact wire collecting surface and the underside of bridge. Maximum height of the projecting ventilators on the country rolling-stock is 14 ft. 2 in., so that considerable care had to be exercised in erection to preserve the clearances necessary. Standard contact wire suspension is maintained, but beneath low bridges, and to ensure that the pantograph would not raise the contact wire more than 2 in., a maximum grade of 1 in 150 was adopted, and where possible, a grade of 1 in 250, except where speeds were limited. A well-aligned line has been obtained, whose vertical movement responds uniformly to the changes of temperature, which vary between 27° and 175° Fahr. Where a steam service is also being used, the insulators are arranged so as to avoid the direct blast of the locomotive exhaust. The whole of the overhead fittings were specially designed by the consulting engineers in conjunction with the contractors.

The standard intermediate structures

Digitized by Google

have been designed and adapted to carry, where possible, the single-arm power-operated signals. Combined four-track signal structures are provided at certain places, whilst there are five pin-arch structures spanning up to 120 ft. and carrying the overhead equipment load of 13 tracks on an 18-chain curve. They are also designed to carry a distributed signal load of about 6 tons. A special four-track construction is provided on Flinders Street Viaduct, this being arranged to take up a minimum of cross-track space, due to the limited clearance between the viaduct and certain adjacent buildings. A special point in the work is the fact that no contact wires are crossed at the pantograph running level. There is a very complete system of circuit and track signalling.



COMPLEX OVERHEAD WORK AT LEVEL CROSSING AND SCISSORS POINTS.

There are 15 sub-stations in which 20,000 volt three-phase current from the generating station is transformed down by static transformers and rotary converters of 1,500 kw., 1,000 kw. and 500 kw. capacity to 1,500 volts direct current. There are also two static sub-stations, one at Newport workshops and one at Jolimont workshops. Special attention has been paid to the ventilation of the sub-stations, and each rotary is installed in a separate compartment, so that during the starting up and operation the chamber is screened off. The 20,000 volt switch gear in sub-stations is designed on similar lines to that in the main power station, but is more compact and smaller in size. Speaking generally, wherever possible, switch gear of the Ironclad type, with special interlocking arrangements, is employed.

Current is conveyed from the generating station to the sub-stations by 20,000-volt feeders, consisting of paper insulated, lead covered, wire armoured cables, with Merz-Price protection. The cables are mainly laid in trenches in the streets, owing to the very limited space available alongside the railway lines. In the nearer districts underground cables are used, but further out overhead transmission on the overhead equipment structures is employed. In these cases transmission lines are carried on brackets extending from the sides of the masts away from the tracks. There is also a complete system of inter-communicating telephones.

Digitized by Google

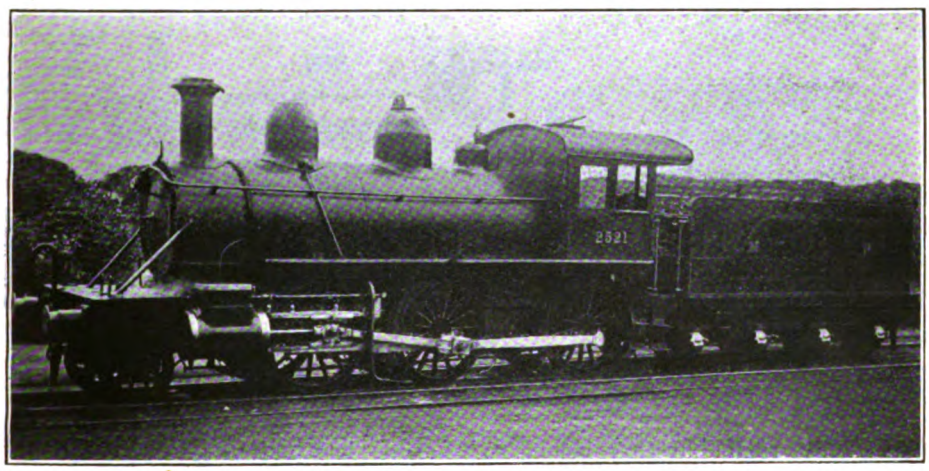
Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. XI.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE year 1899 was remarkable principally for the introduction of the "Mogul" goods engines, built in the United States. Of these 30 came from the Baldwin Locomotive Works (2501 class), and were American in all respects, including the double bogie tenders. The 10 other engines, 2511 to 2520, were built by the Schenectady Works, and had a few British features, chief amongst them being the Midland standard six-wheeled tenders. They were not of particularly large size, as American engines went, having 5-ft. wheels and only 18-in. by 24-in. cylinders. They were stationed at Toton, Sheffield and Leeds, 10 of the Baldwins being at each station, whilst the 10 Schenectady engines were quartered at Wellingborough. They were chiefly on main line coal trains, and eventually most of them collected at Toton and worked coal trains up some of the Erewash Valley colliery branches. But they did not last long, as compared with the life of an English locomotive, and in December, 1914, only one remained at work out of the 40 built 15 years before. This has since followed the others to the scrap-heap.

The year 1900 saw the appearance of the last 10 single engines—enlargements of the previous 115 class. The new engines had 19½-in. by 26-in. cylinders, the driving wheels were increased by ½ in. to 7 ft. 9½ in., and the pressure was 180 lb. The firebox heating surface was increased to 147 sq. ft., and the total heating surface was 1,217 sq. ft. These engines carried 18½ tons on the driving wheels. A feature was the adoption of a tender carried on two bogies with a tank capacity of 4,000 gallons. These tenders had a clumsy appearance, and seemed to spoil the look of the engines, so that the 2601 class went amongst the drivers by the soubriquet of "The Water Carts."



AMERICAN 2-6-0 LOCOMOTIVE, No. 2521.
Built by the Baldwin Locomotive Works, 1899. Coupled wheels, 5 ft. diameter. Cylinders, 18 in. by 24 in. Steam pressure, 160 lb. per sq. in.

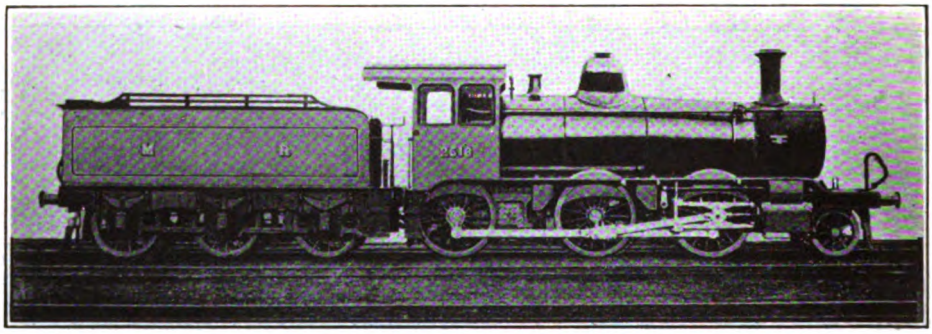
No. 2601, *Princess of Wales*, was sent to the Paris Exhibition, and afterwards, together with 2602-4, was stationed in London. 2605 was at Nottingham. Of

Digitized by Google

the remaining five the first two were at first numbered 2606 and 2607, but immediately on leaving the paint shop at Derby became Nos. 19 and 20, and, together with Nos. 21–23, were stationed at Derby for express work on the London road, *via* both Leicester and Nottingham; but I do not remember that these engines ever worked to Bristol. Shortly after their appearance the London engines, 2601–4, began to run through to Leeds on one of the Scotch expresses, the 9.30 a.m. from St. Pancras. The close of the year 1900 also saw the appearance of the first five 4-4-0 engines with Belpaire fireboxes, Nos. 2606 to 2610 (now 700 to 704). These were stationed at Leeds for work on the Carlisle road, but they belong so essentially to the present century that I shall not include any further details of them or their work in these articles.

At the present time* the locomotive working has altered to some extent from what it formerly was. The London engines, which never ran north of Leicester or Nottingham, now go through to Leeds and to Manchester, and the engines from these towns, in their turn, run through to London. On the West road the Leeds and Sheffield engines do not now run to Birmingham, as they used to do, but come off at Derby. Worcester and Gloucester engines, which used never to run north of Birmingham, now work trains to Derby and Leicester. The working of the engines at the other principal stations is, however, not so very different from what it was formerly, except that the Liverpool engines, which in the early 'eighties had several turns to Derby, have not for a good many years proceeded beyond Chinley. They have—or recently had—however, one turn to Sheffield over the Dore and Chinley line. North of Leeds the locomotive working cannot alter to any extent, owing to the fact that trains which run into Leeds terminal station necessarily change engines at this point.

The Midland engines of the last century were amongst the cleanest and most handsome in the kingdom. But with increased dimensions the one-time characteristic outline has had to give way to bolder, though in some respects less æsthetic lines. I am afraid, however, that the modern tendency towards ultra commercialism is rapidly proving fatal to the artistic appearance of the modern locomotive, not only on the Midland, but also on many other railways.



AMERICAN 2-6-0 LOCOMOTIVE, No. 2516.

Built by the Schenectady Locomotive Works, 1899. Coupled wheels, 5 ft. diam. Cylinders, 18 in. by 24 in. Steam pressure, 160 lb. per sq. in.

Owing to the complete renumbering of the Midland engines which took place in 1907, some readers have experienced a difficulty in identifying many of the engines mentioned in my articles, which naturally had to be described under their old, and in one sense, better-known numbers. In accordance with a wish expressed by some readers I have pleasure in attaching the accompanying list of the altered numbers of those engines which have been described in the previous articles. To give the complete list would take up too much space.

* This refers to 1916, before the drastic train alterations.

Digitized by Google

New Nos.	Old Nos. before 1907.	Description.
1 to 22 ..	156A, 158A, 159A, 89A, 118A, 104A, 105A, 106A, 107A, 76A, 77A, 157A, 119A, 79A, 116A, 160A, 161A, 163A, 164A, 153A, 154A, 155A.	Old 156 class (1866-74) 2-4-0, with double frames. Coupled wheels, 6ft. 2½ in. Cylinders, 18 in. by 24 in. (originally 16½ in. by 22 in.).
23 to 67 ..	165A to 169A, 60A to 66A, 800A, 802A to 806A, 808A to 829A, 138A, 139A, 93A, 22A and 23A.	Old 800 class (1870-71) 2-4-0, with double frames. Coupled wheels, 6 ft. 8½ in. Cylinders, 18 in. by 24 in., except 10 engines, 18 in. by 26 in.
68 to 126 ..	890 to 909, 2, 95, 90, 148, 92, 125A, 5, 12, 123A, 127A, 19A, 40, 41, 43, 46, 49, 91, 67A, 121A, 69A, 131A, 132A, 151A, 152A, 47, 7, 72, 78, 42, 45, 44, 48, 124A, 126A, 128A, 130A, 120A, 135, 136	890 class (1871-75) 2-4-0, with inside frames for coupled wheels. Coupled wheels, 6 ft. 8½ in. Cylinders, 18 in. by 24 in.
127 to 146 ..	1070 to 1089	1070 class (1874) 2-4-0, as above. Coupled wheels, 6 ft. 2½ in. Cylinders, 18 in. by 24 in.
147 to 156 ..	1, 9 10, 13, 70, 71, 73, 74, 96 and 146	No. 1 class (1876), as 1070 class, but with different motion.
157 to 186 ..	1282 to 1311	1282 class (1876) 2-4-0. Coupled wheels, 6 ft. 6 in. Cylinders, 18 in. by 26 in. (originally 17½ in. by 26 in.).
187 to 191 ..	50 to 54	1282 class (1876), as above.
192 to 196 ..	55 to 59	Modified 1282 class (1876), but with 6 ft. 8½ in. wheels
197 to 206 ..	101 to 110	101 class (1877) 2-4-0. Coupled wheels, 7 ft. Cylinders, 18 in. (formerly 17½ in.) by 26 in.
207 to 216 ..	1400 to 1409	1400 class (1879) 2-4-0. Coupled wheels, 6 ft. 8½ in., later 6 ft. 9 in. Cylinders, 18 in by 26 in.
217 to 221 ..	111 to 114, 89	1282 class 2-4-0, see above. 6 ft. 6 in. Cylinders, 18 in. by 26 in. (1880).
222 to 271 ..	1472 to 1491, 1502 to 1531	1400 class as above (1880-81).
272 to 281 ..	1492 to 1501	101 class (1881). Wheels, 7 ft. Cylinders, 18 in. by 26 in.
300 to 309 ..	1312 to 1321	4-4-0. No. 1312 class (1876). Coupled wheels, 6 ft. 6 in. Cylinders, 18 in. (formerly 17½ in.) by 26 in.
310 to 327 ..	1327 to 1331, 1333 to 1335, 1336 (originally 1346), 1337 to 1345	1327 class (1877) 4-4-0. Coupled wheels, 7 ft. Cylinders, 18 in. by 26 in.
328 to 357 ..	1562 to 1581, 1657 to 1666	1562 class (1882-83) 4-4-0. Wheels, 6 ft. 9 in. Cylinders, 18 in. by 26 in.
358 to 377 ..	1738 to 1757	1740 class (1885-87) 4-4-0. Wheels, 7 ft. Cylinders, 18 in. by 26 in. 160 lb.
378 to 402 ..	1808 to 1822, 80 to 87, 11, 14	1808 class (1888-1891) 4-4-0. Wheels, 6 ft. 6 in. Cylinders, 18 in. by 26 in. 160 lb.
403 to 427 ..	2183 to 2202, 156 to 160	2183 class (1892-96) 4-4-0. Wheels, 7 ft. Cylinders, 18½ in. by 26 in. 160 lb.
428 to 472 ..	2203 to 2217, 184 to 199, 161 to 164, 230 to 239	2203 class (1893-95) 4-4-0. Wheels, 6 ft. 6in. Cylinders, 18½ in. by 26 in. 160 lb.
473 to 482 ..	2581 to 2590	1808 class as above (1900).
483 to 522 ..	1667 to 1676, 150, 153 to 155, 204 to 209, 2421-2440	150 class (1896-1901) 4-4-0. Wheels, 7 ft. Cylinders, 19 in. and 18½ in. by 26 in. 160 lb. Piston valves.
523 to 537 ..	60 to 66, 93, 138, 139, 67 to 69, 151, 152	60 class (1898-99) 4-4-0. Wheels, 7 ft. Cylinders, 19½ in. by 26 in. 170 lb. Piston valves.
538 to 562 ..	165 to 169, 805 to 809, 2636 to 2640, 2591 to 2600	Same as 60 class 4-4-0, but with cylinders 19 in. by 26 in.
600 to 659 ..	Old Nos. given on page 342 of RAILWAY MAGAZINE, November, 1919.	4-2-2 single engines.
660 to 669 ..	179 to 183, 75, 76, 77, 79 and 88 ..	179 class (1893-96) 4-2-2 singles. Wheels, 7 ft. 6 in. Cylinders, 19 in. by 26 in. 160 lb. Piston valves.

Digitized by Google

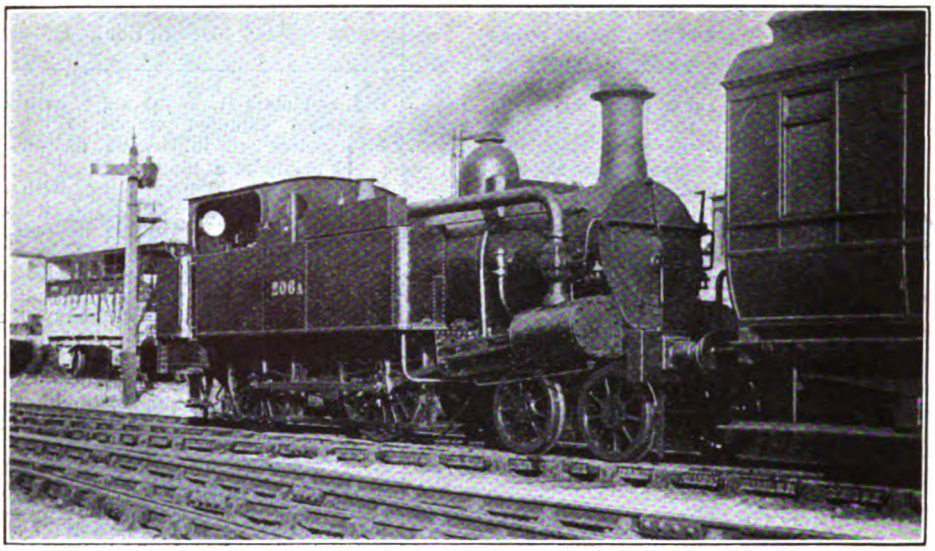


Photo.] **4-4-0 TANK ENGINE (METROPOLITAN TYPE) No. 206a.** [*W. H. Wright.*

New Nos.	Old Nos. before 1907.	Description.
670 to 684 ..	115 to 121, 123 to 128, 130, 131 ..	115 class (1896-99) 4-2-2. Wheels, 7 ft. 9 in. Cylinders, 19½ in. by 26 in. 170 lb. Piston valves.
685 to 694 ..	2601 to 2605, 19 to 23	2601 class (1900) 4-2-2. Wheels, 7 ft. 9½ in. Cylinders, 19½ in. by 26 in. 180 lb. Piston valves.
1200 to 1225..	690A to 695A, 780A to 783A, 784 to 799	690 class (1869-70) 0-4-4 tank engine, with double frames. Wheels, 5 ft. 2½ in. Cylinders, 18 in. by 24 in.
1226 to 1235..	6, 15, 18, 137, 140 to 144, and 147 ..	6 class (1875) 0-4-4 tank engines, single frames (S. W. Johnson). Wheels, 5 ft. 3 in. Cylinders, 18 in. by 24 in.
1236 to 1265..	1262 to 1281, 1252 to 1261	0-4-4 tank engines (1876). Wheels, 5 ft. 6 in. Cylinders, 18 in. (formerly 17 in.) by 24 in.
2900 to 3019..	1142 to 1161, 381 to 385, 400 to 404, 1162 to 1251	Mr. Johnson's first 0-6-0 goods engines. Wheels, 4 ft. 10 in. Cylinders, 18 in. by 26 in. (formerly 17½ in. by 26 in.).
3020 to 3039—	1357 to 1376	Express goods engines (1878). Wheels, 5 ft. 2½ in. Cylinders, 18 in. (formerly 17½ in.) by 26 in.

Of the old 2-4-0 "800" class three engines, Nos. 3, 801A and 807A were broken up just prior to the 1907 renumbering. Of the old "890" class (2-4-0) three engines, Nos. 21A, 68A and 134, were broken up prior to the 1907 renumbering. Of the "1327" class 4-4-0, No. 1336 was broken up and replaced by 1346. No. 1332 was also broken up, and the number remained blank for about a year before the 1907 renumbering. Many of the 4-4-0 engines, now Nos. 328 to 562, have since been rebuilt with large boilers and 175 lb. pressure. Of most of these engines very little now remains of the originals.

Digitized by Google

On the North Eastern Railway:

FROM DARLINGTON TO TEBAY AND PENRITH.

[No. II.]

By H. L. HOPWOOD.

Returning to Tees Valley Junction, the main line proceeds to Darlington, where it bends to the south for some distance, passes over Deepdale Viaduct, and next takes a westerly course through Bowes station. We left the well-wooded neighbourhood of the Tees Valley at Barnard Castle and now notice, as the train climbs slowly up one side of the Pennines and across Bowes Moor, that the surroundings assume a more barren aspect, the journey being through moorland country, which becomes wilder and more sparsely populated at each mile's progress.

Seven and a-half miles from Bowes station the summit of the line is attained at Stainmore. At this spot, where there are a signal-box and sidings, the train is on almost the highest ground reached by any passenger railway south of the Tweed, viz., 1,369 ft.* above sea-level. It should be noted that Stainmore is not the actual summit level of the North Eastern Railway, although it is often referred to as such. This honour really belongs to Weatherhill, on the Pontop and South Shields section, where there is a winding engine to haul wagons up an incline. Only mineral trains are worked over this line.

While on this subject it may be of interest to give details of some of the highest railway altitudes in Great Britain:

Railway.	Summit.	Height.
		Feet.
Highland	Dalnaspidal	1,484
North Eastern	Weatherhill	1,445
Great Western	Princetown	1,373
North Eastern	Stainmore	1,369
North British	Between Currour and Tulloch	1,350
Brecon & Merthyr	Between Dowlais Top and Fochriw ..	1,314
London & North Western	Waenavon	1,286
London & North Western and Rhymney Joint.	Between Nantybwch and Rhymney Bridge	1,216
Midland	Between Hawes and Kirkby Stephen ..	1,166

Near Stainmore is the county boundary between Yorkshire and Westmorland. From the summit a rapid run downhill brings us to Barras. A distance of 10 miles 15 chains separates this station from Bowes—one of the longest stretches in the country without an intermediate station. A mile or two from Barras the famous Belah viaduct is crossed, and, by looking back, a fine view of it is obtained as the train, still rapidly descending, enters a curve in the line. The country now opens out and one sees the town of Kirkby Stephen in the distance below some time before the station of that name is reached.

At Kirkby Stephen the line bifurcates, one section continuing west to Tebay and the other branching north-west

* The height of Stainmore has always been given as 1,378 ft. in reference books, but a recent re-measurement proves this figure to be incorrect. The actual height, as now quoted officially, is 1,369·03 ft.

Digitized by Google

towards Appleby and Penrith. Station accommodation consists of one wide island platform, with booking offices, &c., in the centre, and with up and down lines roofed over for part of their length. From the booking office to the station exit runs a covered way along the middle of the platform. There are independent running roads for mineral trains on the outside, several lines of sidings and an engine shed. Altogether, the station with its stone buildings flanked on either side by glazed roofs of light construction, presents a neat and artistic appearance.

At Kirkby Stephen West the Tebay line becomes single for the next 4¾ miles to Sandy Bank. Near Smardale the North Eastern line passes under the fine Smardale viaduct of the Midland Railway and then over another viaduct of the same name. The latter is the largest example of stone-built viaduct on the Darlington-Tebay section and bridges a deep and narrow ravine through which flows the Scandal Beck. At Sandy Bank, an intermediate signal-box between Smardale and Ravenstonedale, and distant 4¾ miles from Kirkby Stephen, the line again becomes double. Sandy Bank, with an altitude of 889 ft., is also the highest point between Kirkby Stephen and Tebay; thence the line falls all the way to the junction with the London & North Western Railway at Tebay, where North Eastern passenger trains find room in a dark and dismal-looking single-line bay on the up side.

From Kirkby Stephen to Penrith the journey is through the Eden Valley as far as Temple Sowerby, at which station the line turns west to join the London & North Western Railway near Clifton. The surroundings are very fine, the rolling hills of the Pennines being visible on the east side for a considerable distance.

Photo.] [*J. A. Hayes*

0-8-0 LOCOMOTIVE No. 1704 ON GOODS TRAIN NEAR BARRAS.

Near Appleby the North Eastern Railway parallels the Midland Railway for about two miles, and there is a physical connection between the two systems north of the station. With the exception of Clifton, all stations on this section are of the single-platform type, but there are loops for crossing trains at each place except Musgrave and Temple Sowerby. Clifton has two platforms and the line is double thence to Eden Valley Junction. There are also two tracks between Appleby West and Midland Junction. The branch is worked on the staff system as far as Appleby and by electric tablet be-

Digitized by Google

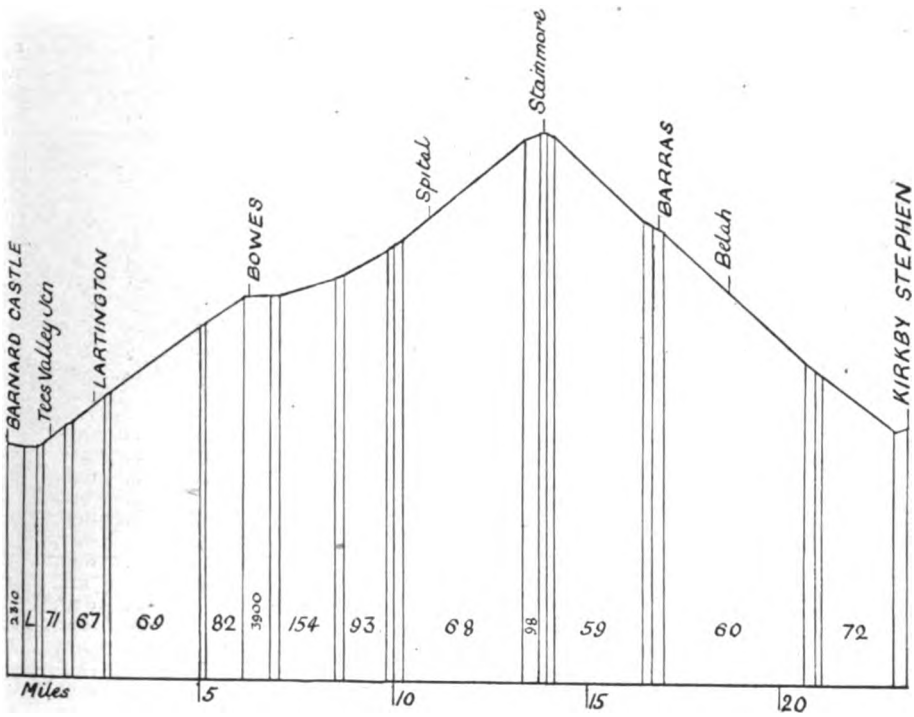
tween Appleby (Midland Junction) and Clifton.

Returning to Barnard Castle, we have finally to notice the line thence to Bishop Auckland. The first station is Cockfield, the journey to which involves a comparatively long run of 7¼ miles and also the 1¼ miles of single line between Coal Road Crossing and Forthburn. Near Evenwood the Butterknowle (mineral) branch approaches and, passing underneath, joins on the up side. This is the original Hagger Leases branch of the Stockton & Darlington Railway, opened in 1830. We are now in the coalfield area and on historic ground, for in this neighbourhood were laid some of the earliest tracks (long since deviated) of the pioneer railway.

West Auckland station has a curious "lay-out," as both platforms are on the right-hand side of the tracks in going towards Bishop Auckland. The down platform is therefore an island, but is not used as such, there being a fence on one side to prevent passengers alighting from up trains. Our journey ends for the present at Bishop Auckland, a station which is better seen than described. It is of triangular form, but is not such a complete example as those at Queensbury (Great Northern) and Ambergate (Midland), as it lacks two of the three sets of outer platforms possessed by the two latter. On two sides there are only single-platform roads for both up and down trains. On the west side the line is roofed over, and this forms the oldest part of the station. In strong contrast to it, the opposite side is quite modern.

In the 16½ miles which separate Darlington from Barnard Castle the total rise is 435 ft., the altitude at the latter station being 595 ft. With the exception of two slight falls after Gainford and Broomielaw, the line is uphill all the way, the heaviest grades being 1 in 74, 76 and 80. A gradient profile of the difficult section between Barnard Castle and Kirkby Stephen is reproduced, so that further description is unnecessary, but it may be mentioned that up trains in running from Kirkby Stephen to the summit have to climb 725 ft. in 9¼ miles.

From Kirkby Stephen the line rises at 1 in 183, 77, 96, 79, &c., to another



GRADIENT PROFILE, BARNARD CASTLE TO KIRKBY STEPHEN.

Digitized by Google

summit at Sandy Bank, after which it falls to Tebay at 1 in 85, 88, 100, 111, 140, &c. In the Penrith direction gradients are less severe. There is a fall between Kirkby Stephen and Musgrave, chiefly at 1 in 100, but from the latter place there is nothing of note until within 1½ miles of Appleby, when a rise at 1 in 100 is encountered. Appleby is the summit of the section; thence the line falls again at 1 in 128, 100 and 155 for 4½ miles. After this the most severe piece is a mile at 1 in 80 approaching Clifton.

In the summer of 1919 four through trains worked from Darlington. Of these the 6.55 a.m. and 3.0 p.m. went through to Penrith (the earlier train having a Tebay connection at Kirkby Stephen), whilst the 12.38 and 5.3 p.m. were Tebay trains with Penrith connections. There was also a train from Kirkby Stephen to Tebay at 7.30 a.m. (giving that station a total of four North Eastern arrivals during the day) and another from Kirkby Stephen to Penrith at 11.30 a.m. This train returned at 1.15 p.m. to Kirkby Stephen, so that Penrith dealt with 5 down and five up North Eastern trains in the day.

The up service to Darlington was very similar, *i.e.*, one through train from Penrith with connection from Tebay, and three from Tebay with Penrith connections at Kirkby Stephen. One extra train each way (two on Wednesdays) between Darlington and Barnard Castle completed the service on this section. All trains called at every station except the 3.0 p.m. ex-Darlington, which omitted Barras, and the 8.12 p.m. ex-Tebay, which ran fast from Barnard Castle to Darlington, North Road. The last departure from Darlington for stations west of Barnard Castle (including the Middleton branch) was at the somewhat early hour of 5.3 p.m., which meant that passengers from London had to leave King's Cross at 10 a.m.

The Middleton branch was served by four down trains (five on Wednesdays), which were through from beyond Barnard Castle—one starting at Leamside, one at Durham and two at Bishop Auckland. A similar number returned from Middleton, two of them terminating at Bishop Auckland and two at Sunderland. The Wednesdays only trains were locals from and to Barnard Castle. The working arrangements in force at that station are curious. Down branch trains run through the platform road and set back into the west bay. Similarly, up trains from Middleton run through the station and are then set back into the east bay. Between Barnard Castle and Bishop Auckland the service comprised six trains in either direction, four of which were extended over the Middleton branch, as already mentioned.

In pre-war summers it was customary to run through coaches from both York and Newcastle to Keswick. Between Darlington and Penrith they were timed as follows:—

DOWN.

M.	C.			a.m.
—		York	dep.	9.57
—		Newcastle	,,	10.4
—		Darlington ..	,,	11.20
1	22	,, N. Road	,,	11.25
16	55	Barnard Castle ..	arr.	11.51
		,, ,, ..	dep.	11.53
39	47	Kirkby Stephen ..	arr.	12.27
		,, ,, ..	dep.	12.28
50	50	Appleby	arr.	12.43
		,, ...	dep.	12.44
64	56	Penrith	arr.	1.5
		,, ...	dep.	1.15
82	69	Keswick	arr.	2.0

UP.

M.	C.			p.m.
—		Keswick	dep.	1.45
18	13	Penrith	arr.	2.30
		,, ...	dep.	2.52
32	19	Appleby	arr.	3.15
		,, ...	dep.	3.16
43	22	Kirkby Stephen ..	arr.	3.33
		,, ,, ..	dep.	3.35
66	14	Barnard Castle ..	arr.	4.9
		,, ,, ..	dep.	4.11
81	47	Darlington, N. Road	arr.	4.38
82	69	Darlington ..	arr.	4.42
		,, ...	dep.	4.56
—		York	arr.	6.10

In the case of the up train, this conveyed York passengers only. The Newcastle coach left Keswick at 12.35 and was due at Penrith at 1.15. From that station it went forward on the 1.40 stopping train and was due to arrive Darlington at 4.9 and Newcastle at 5.9 p.m.

Although passenger trains over the Darlington-Tebay-Penrith section are few in number, the line accommodates a heavy mineral traffic in both directions; coal and coke is taken on west-bound trains and iron ore on trains going east. Certain mineral trains for the West Cumberland district, which travel via Redhills

Digitized by Google

Junction and the Cockermouth, Keswick and Penrith Railway, are worked by North Eastern engines as far as Cockermouth.

Passenger trains are worked entirely by Fletcher 2-4-0 engines of the "901" class. It is somewhat remarkable that these machines with coupled wheels of so large a diameter as 7 ft., should be employed on a section which has such difficult gradients—more especially as the trains stop at every station—but the engines appear to do their work without difficulty.

Owing to the exposed situation of the line, very severe snowstorms are experienced and snow ploughs (a pair at each station) are attached to the depôts at Darlington, Bishop Auckland, Barnard Castle and Kirkby Stephen. There was a notable snow block in 1900, when a storm commenced on Thursday, February 15, and lasted until Sunday, February 18. On the former date a down passenger train became embedded at Barras, and a special, despatched to relieve it, also came to a halt at Bleath Gill. Next, a light engine set out from Kirkby Stephen to ascertain the condition of the up line, but it could get no further than Barras. This had the effect of blocking both lines. In the meantime, a down coal train was snow-bound at Deepdale, and a light engine, sent to assist, could push it only a mile or so further. The passenger train was dug out shortly afterwards, but the 19 passengers had to spend the night at Barras Station and go forward the next day. Normal working was resumed on February 17.

Reference was made in the early part of this article to the literary associations of the district, and something under this heading may now be said by way of conclusion. A few miles south of Barnard Castle is Rokeby, which was visited on two occasions by Sir Walter Scott, who afterwards immortalised the place by his poem of that name. At the King's Head at Barnard Castle, Charles Dickens stayed whilst gathering material for "Master Humphrey's Clock" and "Nicholas Nickleby." "Dotheboys Hall," the famous—or infamous—establishment of Wackford Squeers, Dickens located at Bowes, and the house is still to be seen there.

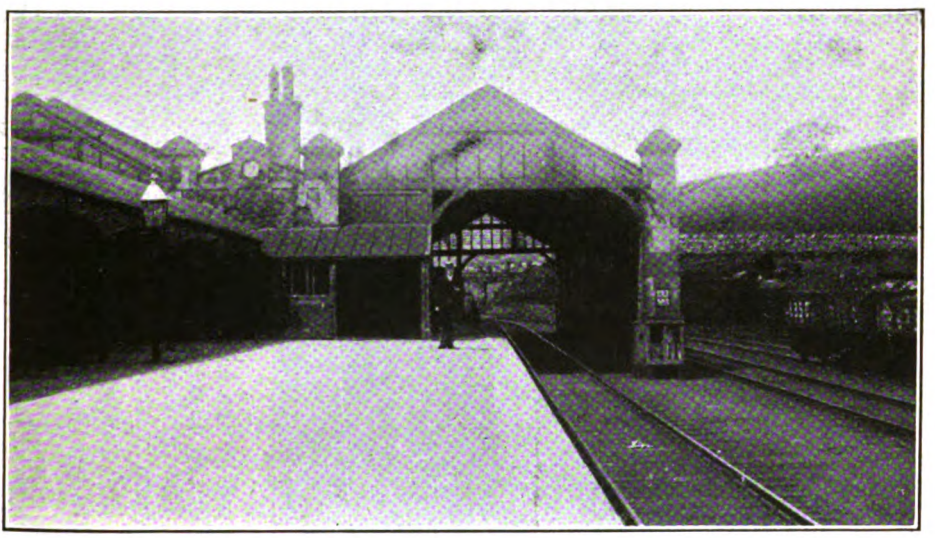
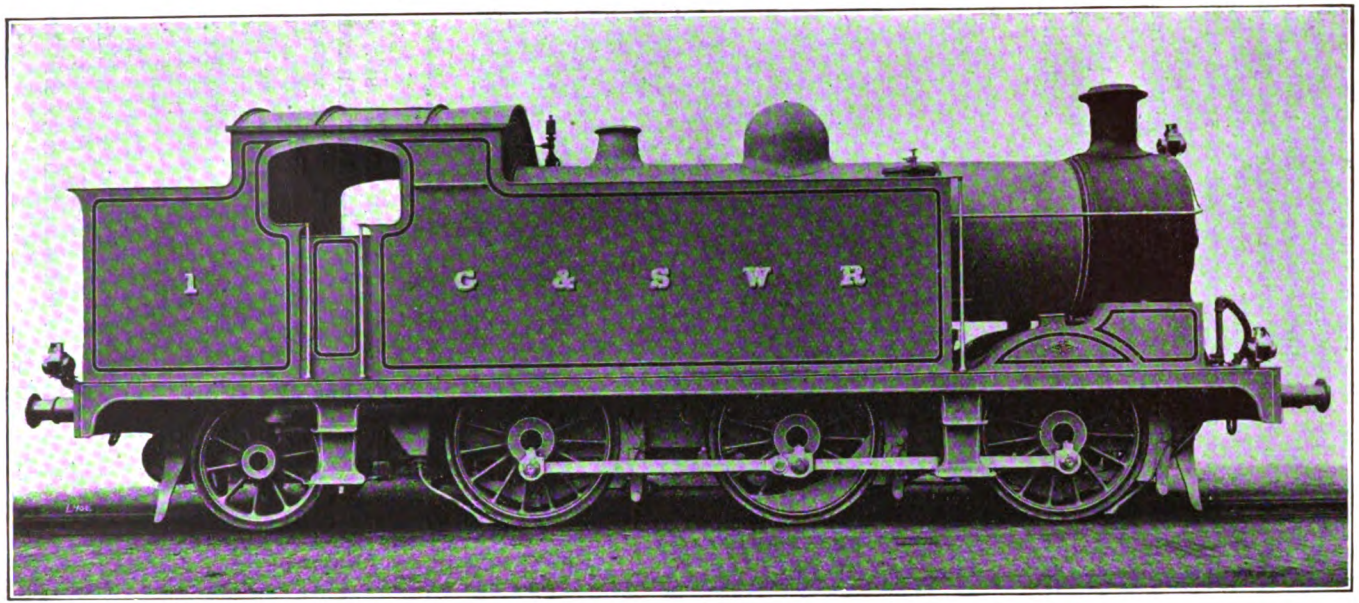


Photo.] **KIRKBY STEPHEN STATION, UP SIDE.** [*H. L. Hopwood.*

Digitized by Google

GLASGOW & SOUTH WESTERN RAILWAY: 0-6-2 TANK ENGINE.

Mr. R. H. WHITELEGG, Chief Mechanical Engineer.



A DEVELOPMENT of a class introduced by the late Mr. P. Drummond, a further series of these useful engines has been constructed by the North British Locomotive Company to the design of Mr. R. H. Whitelegg, the present Chief Mechanical Engineer. Link motion is used, operating balanced slide valves, and the engine is equipped with vacuum and hand brakes, steam reversing gear and other modern fittings.

LEADING DIMENSIONS.

Cylinders	18½ in. by 26 in.	Heating surface: Firebox	110 sq. ft.
Coupled wheels, diameter	5 ft.	Heating surface: Total	1,254 sq. ft.
Radial wheels, diameter	4 ft.	Grate area	22·5 sq. ft.
Boiler, working pressure	180 lb. per sq. in.	Weight in working order	66 tons 19 cwt.
Heating surface: tubes	1,144 sq. ft.	Weight on coupled wheels	52 tons 4 cwt.
Water capacity of tanks	1,910 galls.		

Digitized by Google

Photo.] **MESOPOTAMIAN RAILWAYS.** [*A. Vowles.*

4-6-0 engine at Qurnah, near the reputed site of the Garden of Eden.

The Mesopotamian Railways.

By ALFRED VOWLES, F.R.G.S.

LONG cherished and persistently pursued, the Turco-German dream of a Berlin-Constantinople-Baghdad Railway was fast becoming a reality when war broke out, and hostilities caused the work of construction to be hastened with feverish activity, a railhead at or near Nisibin, a town in Higher Mesopotamia, 130 miles north-west of Mosul, being reached. British prisoners captured by the Turks, were occupied on this section of line, and also on some difficult and incompleted sections in the Taurus Mountains, and were so engaged up to the time of the Armistice, when they were "relieved." Another section of line was being constructed from Baghdad towards Mosul, which was finally to meet the Nisibin section. This lower line had reached the vicinity of Samarra, on the Tigris, 70 miles north of Baghdad, thus leaving a gap of about 280 miles. When General Maude captured Baghdad, the surprise was so complete that our men were able to round up several large German engines and much rolling-stock on the Samarra section. The enemy succeeded in damaging three of these remarkable engines by using explosives on them, but our engineers have since doctored and patched them up, and all are now in use. They were made at Cassel, and are of great size and power.

But to go back to the Turco-German dream! It has given place to an all-British plan, which is also fast becoming a reality—to link up Basrah with London. In a few years time, when the Channel Tunnel is completed, a Londoner may hasten to London Bridge, take a ticket for "Mespot," jump into a train, and after a few days pleasant travelling, find himself at sunny Basrah. What more could he desire?

Before 1915 there were only 70 miles of railway in Lower Mesopotamia, *i.e.*, from Baghdad to Samarra. Up to July, 1919, we had put down for strategical reasons in various parts of the country approximately 750 miles of line of broad and narrow gauges, no mean performance considering the immense and almost overwhelming difficulties. India came to

Digitized by Google

the rescue and supplied much of the rolling-stock and material for the permanent ways. The history of the Mesopotamian railways and how they came to be transported and laid would make—like the story of the river-ships—most fascinating and instructive reading.

Basrah to Nasariyah, on the Euphrates, via Zubeir, and Basrah to Amara, on the Tigris, via Qurnah, were the two first sections of line put down since our occupation. Later came the lines from Kut to Baghdad; Baghdad to Hillah on the Euphrates via Babylon, opening up an important grain and produce-growing country; Baghdad to Dhibban on the Euphrates via Feluja, a section which fed our troops operating in the middle Euphrates basin; and the Baghdad to Khanikin section which helped our operations in that part of the country. This last line reaches the borderland of West Persia and crosses the Diala River, over which a fine bridge has been constructed.

The railhead of the Basrah-Baghdad link is already far up the plain of the Euphrates*, and will go via Ur of the Chaldees and Kerbela, crossing the river near Museyib, and thence to Baghdad. Recently we have pushed on with the Baghdad-Nisibin link, the section beyond Samarra having already reached Baiji on the Tigris, 80 miles south of Mosul, or 150 from Baghdad.

All this may look very attractive on paper, and one may imagine Tommy Atkins going to the nearest station, selecting a seat in a luxurious Indian carriage, and soon finding himself at his destination. Nothing of the kind has been, or is, possible, for he and everyone else has had to rough it under war conditions. No one has grumbled at this, of course. A soldier could sometimes select one of two things, viz., an iron cattle truck, with a galvanized roof, or an open goods or coal wagon. In the former he could gasp and roast and melt in the heat of the day, or, if in winter, warm himself by a brazier, if obtainable. Were he a fresh-air fiend and selected an open coal wagon during the coolest parts of the day, he had the advantage of obtaining uninterrupted views of the "scenery" as the train crawled on its desert way. If in winter, when the icy blasts sweep over the country and the thermometer often drops below zero, he could snuggle down in some corner and shiver, freeze, and perhaps perish.

Photo.] MESOPOTAMIAN RAILWAYS. [*A. Vowles.*

0-6-0 engine on ambulance train crossing the desert to Baghdad.

* Since these notes were made the Baghdad-Basrah section of the European-Persian Gulf Railway has been completed, and through trains run daily between these cities.

Digitized by Google

British Locomotive Practice and Performance.

By CECIL J ALLEN.

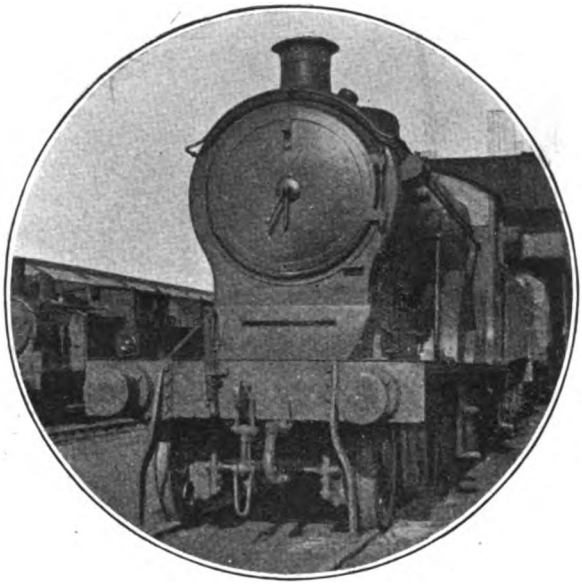


Photo.] [*G. M. Richards*

GREAT EASTERN RAILWAY.

4-4-0 rebuilt superheater locomotive No. 1027.

BY the courtesy of Sir Herbert Walker, K.C.B., the General Manager and Mr. R. W. Urie, the Chief Mechanical Engineer of the London and South Western Railway, I have recently been afforded an opportunity of recording on the footplate the performance of Mr. Urie's latest 4-6-0 express engines of the "736" class, and the data thus obtained are of such interest that I propose to devote the bulk of the present article to the observations recorded. It will be remembered that the most unusual feature of these engines is found in the size of their cylinders, which have a diameter of no less than 22 in., coupled with a stroke of 28 in.—dimensions shared only in this country by the large London, Brighton and South Coast Railway 4-6-4 tank engines of the "Charles C. Macrae" class. In cubic capacity two such cylinders are equal to four either 15½-in. diameter by 28-in. stroke, or four of 26-in. stroke—the more usual figure with four-cylinder engines—by a shade over 16-in. diameter. Despite these unusual dimensions, however, there was not on any of the journeys I took on the engine the least symptom of "shortness of breath," a fact which speaks excellently for the steam-raising capacity of the boiler. Not all my journeys were made on the footplate, but those I did so take were sufficient to convince me of the exceptional efficiency and economy embodied in the performance of these fine engines.

The first train by which I elected to travel was, not unnaturally, the 10.50 a.m. *ex*-Waterloo, which, despite its substantial loading, receives preferential treatment in the matter of speed as far as Basingstoke, covering this initial distance of 47·9 miles, almost entirely "against the collar," in the even hour, instead of the customary 62 min. In this connection, by the way, I feel bound to modify certain remarks I made in the November issue as to the demands made on the locomotives by the current schedules of express trains on the London and South Western Railway. Coupling the restriction of maximum speeds to 60 m.p.h.—which appears to be more strictly observed on the South Western than on any other line on which it has been enforced as a wartime measure—with the substantially increased average loading of trains, I found that these bookings leave a great deal less margin than I had previously imagined. Restriction in speed, in particular, has a tremendously hampering effect on London and South Western running.

Our engine on this occasion was No.

Digitized by Google

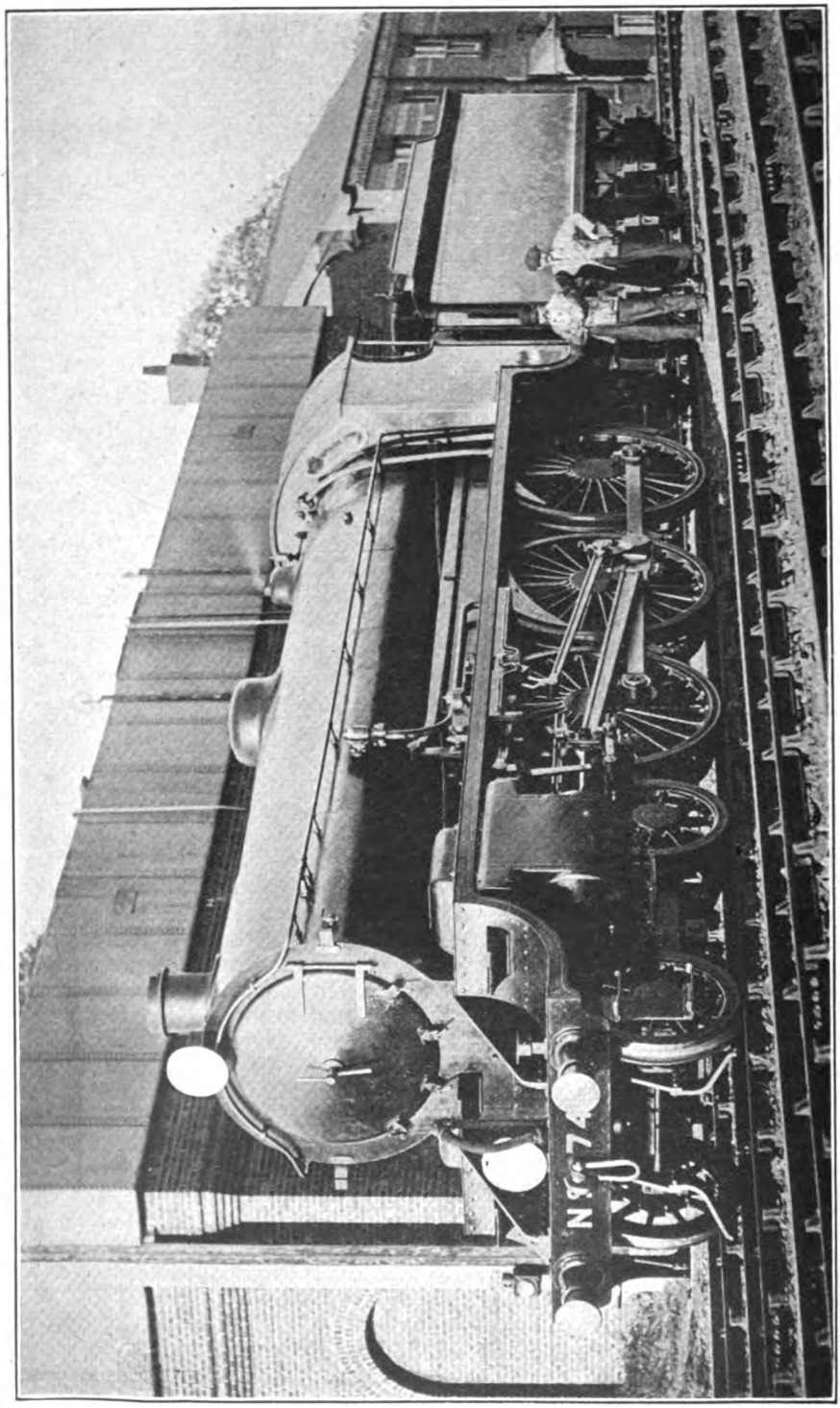


Photo.] LONDON & SOUTH WESTERN RAILWAY. [R. Barrett.

Two-cylinder 4-6-0 superheater express locomotive No. 743 (Driver C. Clarke) at Exmouth Junction.

Digitized by Google

736, driven [by J. Gee, and the load 12 eight-wheelers, including restaurant car and four non-corridor cars. Tare load behind the tender was 324 tons, and gross load about 350 tons, as the train was well filled. There was a bad south-west headwind and continuous rain.

Getting away smartly with the usual assistance in rear out of the platform, we passed Clapham Junction, 3·9 miles, in 7 min. 50 sec., Wimbledon, 7·3 miles, in 12 min. 40 sec., Surbiton, 12·1 miles, in 18 min. 35 sec., Hampton Court Junction, 13·4 miles, in 20 min. 10 sec., Weybridge, 19·2 miles, in 26¾ min., and Woking, 24·4 miles, in 32¾ min. At the conclusion of the 10½-mile climb to mile-post 31, steepening from 1 in 388 to 1 in 298, we were doing, as nearly as I could estimate, the merest shade under 45 m.p.h.; my chronograph was unfortunately in "hospital" at the time, and I was therefore reduced to working off a plain second-hand. At the commencement of the bank, beyond Weybridge, we had been travelling at between 55 and 56 m.p.h., and this comparatively small drop of 11 m.p.h. in the speed, during the course of 10½ miles' ascent, on an unvarying cut-off of only 35 per cent., struck me as a notable tribute to the tractive powers of the engine. On the level stretch from mile-post 31 to Fleet, and again on the slight dip beyond Hook, we touched 56 m.p.h., the time from Waterloo to the mile-post being 41 min. 25 sec., to Farnborough, 33·3 miles, 44 min. 5 sec., to Winchfield, 39·9 miles, 51 min. 25 sec., and to Basingstoke, 47·9 miles, 60 min. 25 sec. At Battledown, after 5 miles ascending at 1 in 249, cut-off was momentarily advanced from its previous figure of 35 per cent. to one of 47½ per cent., and speed was thereby maintained at 44 m.p.h. Worting Junction, 50·4 miles, was passed in 63 min. 40 sec.—a shade inside schedule time. Throughout this distance the regulator had been full open; but a great deal easier work is sufficient over the concluding stages of the run. Passing Whitchurch, 59·3 miles, in 73 min. 55 sec., and Andover, 66·4 miles, in 80½ min., we compassed the 7 miles' ascent to Grateley (1½ at 1 in 220, then a mile falling at 1 in 330, then 1¾ miles at 264, and 2¾ at 165), again on a cut-off of 35 per cent., and with regulator full open, without the speed falling below 38½ m.p.h. So Grateley, 72·8 miles, was passed in 87 min. 35 sec., and Porton, 78·3 miles, in 94 min. 25 sec., and then, shutting off steam on the final descent, we reached Salisbury, 83·8 miles, in 100 min. 50 sec.—over 2 min. ahead of time. During the whole of this successful run, despite the fact that the coal was of poor quality and very dusty—as it so frequently is nowadays on the majority of lines—there was never any lack of steam, and the needle of the pressure-gauge remained steadily at the 180-lb mark, which reflects credit on both the driving and the firing.

On a subsequent run on the same train I was a passenger. The tare load was the same, but the train was packed as full as it would hold, both compartments and corridors, and the gross load could not have been less than 360 tons. No. 737 was the engine, driven by Joy. We had signals on just after starting, and so took 9 min. 10 sec. to get through Clapham, subsequently passing Wimbledon in 14 min. 5 sec., Surbiton in 19 min. 50 sec., Hampton Court Junction in 21 min. 20 sec., Weybridge in 27 min. 50 sec., Woking in 33 min. 50 sec., mile-post 31 in 42 min. 55 sec., Farnborough in 45 min. 50 sec., Winchfield in 53 min. 10 sec., Basingstoke in 62 min. 20 sec., Worting Junction in 65¾ min., Whitchurch in 76 min. 5 sec., Andover in 82 min. 55 sec., Grateley in 90 min. 40 sec., and Porton in 97 min. 20 sec.; Salisbury was reached in 103½ min., or 102½ min. net. It will be seen that No. 737 was gradually falling behind No. 736 throughout the journey, the speeds being slightly lower at all the important points, *e.g.*, 42½ m.p.h. at both mile-post 31 and Battledown, and 38 at Grateley, with a maxima of 56½ m.p.h. beyond Weybridge, 56½ beyond Hook, 68 at Andover, and 67 before Salisbury. Still, on a misty day, with a greasy rail and a very substantial load, this was good work. By comparison, No. 465—one of the excellent superheated 4-4-0's of the late Mr. Drummond's latest series—did even better, but this was on a lighter 11-coach train of not more than 310 tons in all. Densley was the driver, and he was through Clapham in 7 min. 55 sec., Hampton Court Junction in 19¾ min., Woking in 32 min. 34 sec., Farnborough

Digitized by Google

in 44 min. 38 sec., Basingstoke in 60 min. 32 sec., Worting in 63 min. 46 sec., Whitchurch in 73 min. 28 sec., Andover in 1 sec. under 80 min., and Grateley in 87 min. 43 sec.; Salisbury was reached in 100 min. 37 sec.—2½ min. before time. At mile-post 31 the minimum rate was 41½ m.p.h., and at Battledown the excellent figure of 46 m.p.h. This run was timed by a correspondent now in West Africa.

My return footplate trip was made on the 12.44 p.m. express from Salisbury to London; but with a load of only 209 tons tare (220 tons full), Driver F. Cocker was hard put to it to know how to restrain No. 742 from gaining time by handfuls. As he remarked to me: "This is no use to you; but you want to see us with 14 or 15 on!" So I could well believe. We started off gamely up the 10-mile ascent to mile-post 73¼ (Grateley); on the 2¾ miles at 1 in 169 we accelerated to 44½ m.p.h., and on the subsequent 1¼ miles at 1 in 140 past Porton only fell to 42 m.p.h. This was with the regulator wide open, on a cut-off of 35 per cent. So we passed Porton, 5·5 miles, in 9½ min., and Grateley, 11 miles, in 17 min. 10 sec. After that it was simply a matter of filling in time. So easily, indeed, was the engine running that throughout the journey our consumption of coal was under, rather than over, ¾-ton—an average of about 20 lb. per mile! Nothing could have brought home to me more forcibly than did this journey the undoubted economy of the big engine, even when working far inside its maximum tractive capacity, as I have so often argued in these columns. When running down the modest grades from mile-post 31, with the regulator only ¼ open and on a cut-off of 15 per cent., it was necessary to apply the brakes from time to time in order to prevent the engine exceeding the statutory maximum of a mile-a-minute! The 6·4 miles from Grateley to Andover took 7 min. 40 sec., the 7·1 miles thence up to Whitchurch 9¼ min., the 8·9 miles on to Worting 10¼ min., and Basingstoke, 35·9 miles, was passed in 46 min. 55 sec., 2 min. early. From here onwards the regulator was never more than ¼ open, nor the cut-off over 20 per cent., until after we were severely slacked by signal at Esher.

Photo.] LONDON & SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

10.50 a.m. ex-Waterloo at Salisbury. Urie 4-6-0 express locomotive No. 738.

Digitized by Google

Basingstoke to Woking took 29 min., Woking to Clapham, despite the check, took 21 min. 50 sec.—we were still 2¼ min; early—but adverse signals beyond Vauxhall made us 50 sec. late into Waterloo. Net time from Salisbury was about 104 min., instead of the 108 min. allowed, but obviously the big engine was working far inside her maximum powers.

On a subsequent evening I was a passenger in the 6·54 p.m. up from Salisbury, when our engine was No. 739, at the head of another light train, of only 34 axles, weighing 245 tons in all. Again we made a good start, maintaining 40 m.p.h. on the 1 in 169, and 37½ on the 140; so we passed Porton in 10 min. 10 sec., Grateley in 18¼ min., Andover in 25 min. 5 sec., Whitchurch in 33 min. 10 sec., Worting in 43 min. 55 sec., and Basingstoke in 46 min. 20 sec. It will be seen from these times that we took the Andover "dip" at a higher speed than on the previous journey, although we did not exceed 64½ m.p.h., and our lowest speed on the ascent from Whitchurch was 47½ m.p.h. Beyond Basingstoke we were doing 69 m.p.h., and covered the 10·5 miles from Worting to Winchfield in exactly 10 min., but after this the engine showed distinct signs of fatigue—presumably the driver thought he was gaining too much time—and so, on the level stretch, concluding with the tiny ascent to mile-post 31, we actually fell to a shade over 40 m.p.h.! This was a very poor exhibition, and the more so as the train was running 13 min. late from Salisbury. We had regained 2¾ min. to Basingstoke by good uphill work, and without any speed in excess of the specified maximum might have made this over 6 min. at Woking. As it was, by passing Woking in 71 min. 40 sec., we had gained 4¼ min., but with so extraordinary a time allowance as 7 min. for the 5·2 miles, entirely downhill, and with no service slacks, between Pirbright Junction and Woking, it would be difficult for the driver of any up express to avoid gaining at least some time here. After this the running was of little interest, as we took 11 min. 25 sec. from Woking to Hampton Court Junction, exactly the same time thence to Clapham Junction, 4 min. 10 sec. from there to Vauxhall—we had thus lost

Photo.] LONDON & SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

10.50 a.m. ex-Waterloo at Salisbury. Superheated Drummond four-cylinder 4-6-0 engine No. 445.

Digitized by Google

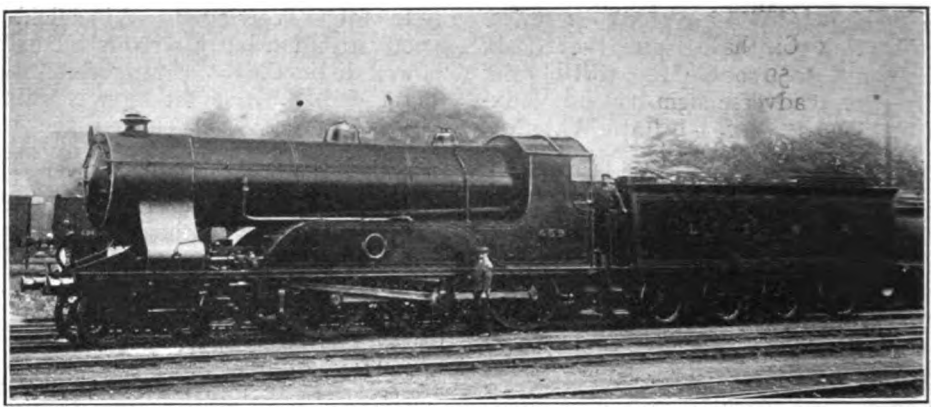


Photo.] [*H. M. Rewse, Salisbury.*

LONDON & SOUTH WESTERN RAILWAY.

Four-cylinder 4-6-0 engine (6 ft. 7 in. coupled wheels), No. 459. Designed by the late Mr. D. Drummond and rebuilt by Mr. R. W. Urie with "Eastleigh" superheater.

a minute on schedule from Woking without any checks—and then came the usual checks outside Waterloo, so that finally we arrived in 106 min. 50 sec. from Salisbury, schedule being 106 min. Net time was 103¾ min., but unchecked, we might, with more enterprising work, have completed the journey in 98½ min. from Salisbury, ½ min. inside the pre-war schedule of this train, and that without any maximum over 60 m.p.h.

By far my most interesting footplate trip, however, was one from Salisbury to Exeter, over what is, I suppose, the most difficult express route—in proportion to the average speeds run over it—to be found in the country. It is on this section of the London and South Western Railway that the limitation of speed is felt more seriously than any, as high speeds were so depended on at the foot of the falling grades to provide the necessary impetus for the ascent of the subsequent rising grades of this extraordinarily steep and switchback course. Consequently, if the limitation be strictly observed, even the present greatly decelerated times become distinctly difficult when the loads are at all heavy. And it was my good fortune, on the only day which I had free to make this run, to find No. 743—the first of the engines of this type to come down to Salisbury shed, and that but a week or two before—at the head of a very crowded 12-coach train, weighing 319 tons empty, and over rather, than under, 350 tons full, as four of the vehicles were non-corridor. The train was the 12.41 p.m. from Salisbury (10.50 a.m. from Waterloo). Driver C. Clarke was in charge, and it was a great pleasure to me to travel with a man so thoroughly enthusiastic about his engine—which he was, I believe, prepared to back against any other type extant!—and so keen on his work. As regards the weather, there was a strong south-west headwind with a certain amount of mist, making the rails greasy, and later turning to rain. The coal was, as on previous journeys, poor, with a large proportion of slack, but this only served to emphasise the excellence of the firing throughout the trip, as even on the steepest of the climbs there was generally a wisp of steam blowing off at the safety-valves.

Out of Salisbury the grades are generally against the engine as far as Semley, 17·6 miles, and culminate in a 2-mile rise at 1 in 145. The immediate start, too, is a rise of a mile at 1 in 115, but when we had surmounted this, and passed Wilton, 2·5 miles, in the excellent time of 6¼ min., the cut-off was not advanced beyond 35 per cent. from there to the summit, the regulator remaining full open. So Tisbury, 12·5 miles, was passed in 19 min. 40 sec., and Semley in 27 min. 5 sec., at a speed of 34 m.p.h. Thence we ran gently down to Templecombe, with frequent applications of the brake, the 4·1 miles from Semley to Gillingham taking 4 min. 25 sec., and the 6·7 miles thence to

Digitized by Google

Templecombe 7 min. 10 sec.—total 28 min. 40 sec. from Salisbury, or just inside schedule time. Templecombe stands on the middle of a 3-mile bank, of which one mile approaching the station is at 1 in 80, and 1½ miles beyond to the summit are at 1 in 100; on this our speed fell to 32½ m.p.h., mile-post 113½, at the summit, 29·7 miles from Salisbury, being passed in 41 min. 10 sec. Brakes were again applied on the descent to Yeovil Junction, the 4·8 miles from mile-post 113½ to Sherborne taking 5 min. 35 sec., and the 4·6 miles on to Yeovil Junction, 4 min. 35 sec. With a total time of 51 min. 20 sec. to the latter point we had now 1¾ min. in hand. After Yeovil Junction comes Sutton Bingham bank—3½ miles, mostly at 1 in 150–140—on which our speed fell to 32½ m.p.h. again, the 3·4 miles from the junction up to mile-post 126¼ taking 4 min. 35 sec., and the 5·4 miles thence down to Crewkerne 6 min. 5 sec. Exactly 62 min. from Salisbury to this point, 47·9 miles, represented a gain of 2 min. Crewkerne, like Templecombe, is situated in the middle of a stiff rise—here 2¾ miles at 1 in 80, and on this, with cut-off finally advanced to 40 per cent., our rate fell to 21½ m.p.h., mile-post 133¼—the summit, 49·5 miles from Salisbury—being passed in 66 min. 5 sec. The long descent thence to Axminster was negotiated in fairly close conformity with the speed restriction, the 6·4 miles from the summit to Chard Junction taking 7 min. 5 sec., the 5·1 miles on to Axminster in 4¾ min., and the ensuing 3·3 miles over the bottom of the "dip" to Seaton Junction, 3 min. 10 sec. Our total time of 81 min. 5 sec. to this point, 64·3 miles from Salisbury, was thus 81 min. 5 sec., or 3 min. inside schedule.

By now we were fairly launched on the redoubtable Seaton bank, which has a total length of 7 miles. From mile-post 146¼, which we passed in 79 min. 20 sec. from Salisbury, it runs up at 1 in 100 for 1¼ miles, followed by ¼-mile at 1 in 300 through Seaton Junction. Then come 4½ miles continuously at 1 in 80—save for a yet steeper strip at 1 in 70 between mile-posts 150¼ and 150¾—to mile-post 152½, just at the entrance to Honiton Tunnel. Through the tunnel, which is very wet and has correspondingly greasy rails, the grade is 1 in 132, and terminates at about 153⅜ miles; it is, therefore, necessary to take mile-post 153½ as the summit. In the aggregate this tremendous climb tallies very closely with that from Tebay to Shap Summit on the London and North Western Railway. "She won't be worrying any more about it when she gets to the top than she was before she started," shouted the driver in my ear, and sure enough he was right! With the regulator wide open, at mile-post 150 we were doing 25·7 m.p.h. on a cut-off of 45 per cent.; at 151 the rate was 22·3 m.p.h. and the cut-off 50 per cent.; while at 152 we had got down to 21·8 m.p.h.

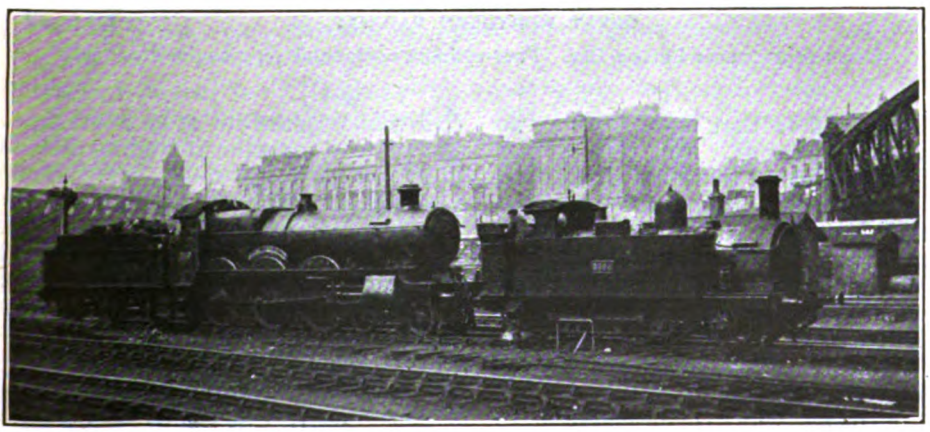


Photo.] GREAT WESTERN RAILWAY. [*P. S. A. Berridge.*

Two-cylinder 4-6-0 engine No. 2918 "Saint Catherine," and 2-4-0 tank engine No. 3598, outside Paddington Station.

Digitized by Google

and the cut-off had risen to its maximum of 55 per cent. And after all this, with dusty coal and a 350-ton train, so skilful had been the work of Fireman Searle that we entered the tunnel with steam blowing off! Through the tunnel sand was applied, and we passed mile-post 153½ in 94¼ min. from Salisbury, having completed the 7¼ miles up from mile-post 146¼ in 14 min. 55 sec. That is to say, a total weight, including engine and tender (after making allowance for the coal and water consumed) of fully 475 tons had been lifted a clear 400 feet in the course of 7 miles at an average speed of 29·2 m.p.h., on a cut-off at no point exceeding 55 per cent., and only advanced to that figure within two miles of the summit. And this average was secured despite the speed limitation; we certainly commenced the climb at 67 m.p.h.—this one and only slight excess of the "rubric" left me marvelling how the driver managed to estimate his speeds as closely as he did, without the assistance of any speed-indicator and in view of the variety of noises ever-present on the footplate—but that was as nothing to the "80's" which used regularly to obtain in the neighbourhood of Axminster.

Well, our troubles were now over; 1 min. 40 sec. from mile-post 153½ sufficed to carry us down the 1·5 miles to Honiton, and a further 5 min. 20 sec. over the ensuing 4·6 miles to the stop at Sidmouth Junction. This was, therefore, reached in exactly 101¼ min. from Salisbury, 3¾ min. having been gained on schedule with a 12-coach train in this distance of 75·8 miles. As regards the remainder of the run we passed Whimple, 3·7 miles, in 6 min. 25 sec.; Pinhoe, 9·3 miles, in 11 min. 50 sec.; and should have reached Exeter, 12·2 miles, in 15¾ min., but for a p.w.r. check at Lion's Hole, which made the time 16 min. 35 sec. Driver Clarke, therefore, had in all 5 min. to his credit, and this fine running had been secured on a consumption of about 25 cwt. of coal, which works out at an average, over this route of exceptional grading difficulty, of merely 32 lb. per mile. Mr. Urie is to be congratulated on the production of so efficient and economical an express locomotive type, and the unanimity with which all the drivers to whom I spoke testified to the capabilities of these engines was very striking to hear. No. 743, at Salisbury shed, was covering a mileage of about 4,000 per month, but had not been in service for very long since construction; Driver Gee's engine (No. 736) had, however, been running for 15 months continuously with practically nothing in the way of repairs.

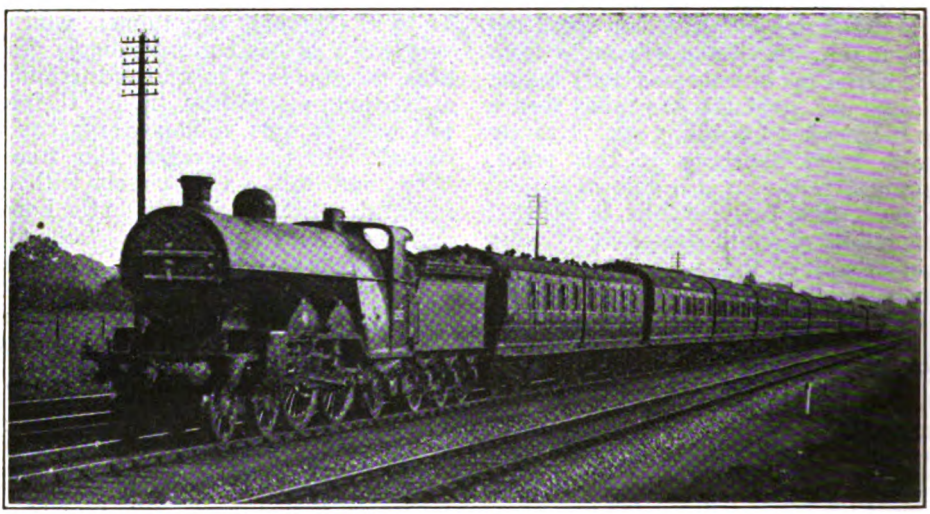


Photo.] GREAT NORTHERN RAILWAY. [*H. R. H. Ward.*

Down express near Potters Bar. Four-cylinder compound 4-4-2 engine No. 292.

Digitized by Google

By way of comparison a correspondent's run on the same train, with an almost identical load, again of 350 tons, is worth mention. Despite the advantage of 6 ft.-wheels as against 6 ft. 7 in., No. 453—a Drummond 4-cylinder 4-6-0—did not do nearly so well up the banks, falling to 33½ m.p.h. at Semley, 27 m.p.h. on Templecombe bank, 27 again on Sutton Bingham bank, 20½ m.p.h. on Crewkerne bank, and 19·7 m.p.h. on the steepest part of Honiton incline. Semley was passed in 27 min. 35 sec. from Salisbury, Templecombe in 39 min. 50 sec., Yeovil Junction in 54½ min., Crewkerne in 67¾ min., Axminster in 84 min. 20 sec., and Honiton in 103 min. 20 sec.; Sidmouth Junction was reached in 108¼ min. Higher maximum speeds were run also, as 63 m.p.h. before Templecombe, 65 at Sherborne, 67 before Yeovil Junction, and 64 in the descent to Axminster. My correspondent did not give the times at which the various summit points were passed, but it is evident from the minimum speeds that the uphill work of No. 453 was altogether inferior to that of No. 743.

I dealt with the running on the Bournemouth section as recently as December, 1919, but, in order to complete these records of the work of the new engines, I may as well conclude by detailing a few journeys over that route. On the 1.30 p.m. *ex*-Waterloo we had the services of No. 737, whose load was a mere featherweight of eight 8-wheelers and one 6-wheeler of non-corridor stock, weighing 204 tons empty and 220 tons full. We were practically brought to a dead stand by adverse signals outside Waterloo, but even so passed Clapham Junction 8 min. 10 sec., Wimbledon in 12 min. 35 sec., Surbiton in 18 min. and Hampton Court Junction in 19½ min., Weybridge in 26 min., Woking in 31 min. 55 sec., mile-post 31 in 40½ min., Farnborough in 43 min. 10 sec., Winchfield in 50 min. 25 sec., Basingstoke in 59 min. 40 sec., and Worting Junction in 63 min. exactly, having to this point gained 3 min. on schedule. Maximum speeds had been 56½ m.p.h. beyond Surbiton, 58½ beyond Weybridge, 57 at Fleet, and 56½ beyond Hook; while the lowest rate at mile-post 31 was 44½, and at Battledown 43 m.p.h. The net time of but little over 58 min. from Waterloo to Basingstoke was the best that I recorded on these journeys. After Battledown we had a severe p.w.r. check, and then, in descending to Eastleigh, it was simply a case of filling in time as best we could; this the driver achieved by negotiating this magnificently-aligned racing stretch at an average of 50–52 m.p.h.! So we passed Litchfield Box, 56·7 miles, in 72 min. 35 sec., Winchester, 66·7 miles, in 85 min., Eastleigh, 73·6 miles, in 92 min. 50 sec., Northam Junction, 78·2 miles, in

Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

Up goods train near Orpington. 0-6-0 locomotive No. 280.

Digitized by Google

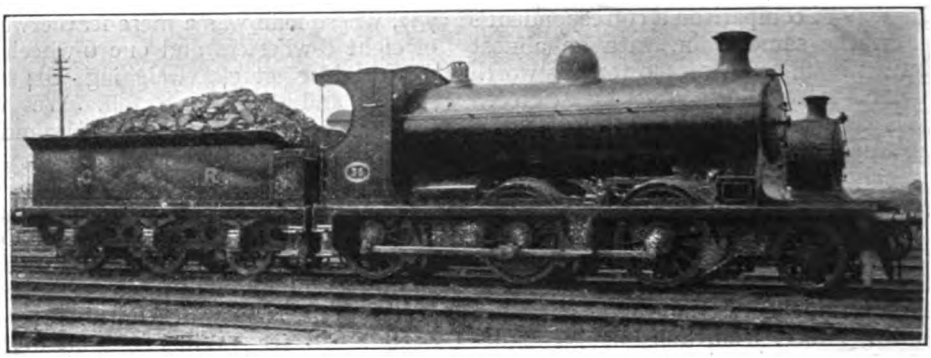


Photo.] CALEDONIAN RAILWAY. [*W. H. Whitworth.*

2-6-0 goods engine No. 35.

98 min. 55 sec., and reached Southampton West in 101½ min., or 98 min. net—1½ min. and 5 min. respectively, inside schedule time. On this section there is another extraordinary timing for all non-stopping trains, *viz.*, from Winchester to Eastleigh, 6·9 miles continuously falling, and devoid of any service slacks, allowed 9 min. Such figures as these are not conducive to good sectional time-keeping, and two minutes of this excessive allowance might reasonably be added to the difficult 51 min. schedule from Woking to Winchester.

My only really poor journey behind one of the new engines was on a special relief express at 10.30 a.m. from Waterloo on Christmas Eve, also non-stop to Southampton, when I found No. 739 at the head of a train of 11 8-wheelers and one 6-wheeler, non-corridor, weighing 274 tons empty and 290 tons full. The only checks were at Surbiton and Northam Junction—these were severe signal delays—and a very slight check approaching Litchfield; but we took 7¾ min. to Clapham, 22 min. to Hampton Court Junction, 36½ min. to Woking, 45 min. 55 sec. to mile-post 31, 67 min. 5 sec. to Basingstoke, 70 min. 50 sec. to Worting, 81 min. 55 sec. to Litchfield, 91 min. 10 sec. to Winchester, 98 min. 5 sec. to Eastleigh, and 108 min. 5 sec. to Southampton. Net time was certainly 103 min., as booked; but we could easily have done far better than we did. It will be remembered that this was the engine that gave me the variable running from Salisbury to London.

Two trips on the 12.30 p.m. *ex*-Waterloo are worth mention, in both cases behind superheated Drummond 4-4-0's of the "463" series, although their performance was not in either case up to the standard of the running given in the December issue. Eleven-coach trains figured in each run, the empty weight being 302 tons, and the full tonnage 330 and 320 tons behind engines 468 and 472 respectively. We passed Clapham in 8 min. 5 sec. and 10 min. 40 sec (we had not been banked in rear out of the terminus in the latter case, and so started very slowly); Hampton Court Junction in 20¼ min. and 24 min. 10 sec., Woking in 33 min. 50 sec. and 37 min. 55 sec., mile-post 31 in 45½ and 48 min., Basingstoke in 66 min. 55 sec. and 68 min. 25 sec., Worting in 70¾ min. and 72 min. 10 sec., Litchfield in 80 min. 25 and 35 sec., Winchester in 90 min. 55 sec. and 91 min. 10 sec., Eastleigh in 97 min. 5 and 35 sec., Northam Junction in 102 min. 30 and 35 sec., and reached Southampton in 104 min. 50 sec. and 105 min. 10 sec., the loss on schedule in each case being about 2 min. No. 468 kept time to Woking, but lost over 6 min. between there and Winchester, mainly in consequence of very poor work up to mile-post 31 and also up to Battledown, with a minimum of 34½ m.p.h. in each case. No. 472, on the other hand, started very badly, losing 4 min. to Woking; but after that did much better, not falling below 37½ m.p.h. at mile-post 31 and 39 at Battledown, and thereby only losing 2 min. from Woking to Winchester. It will be evident from the times that both engines ran very fast from Litchfield: No. 468 touched 71½ and No. 472

Digitized by Google

69 m.p.h. If the times of No. 472 from Woking to Micheldever be added to those of No. 468 from Waterloo to Woking and Micheldever to Eastleigh, and the best subsequent times be taken from each run on to Southampton, a net figure of 100¼ min. is obtained, which shows how curiously variable was the running on these two trips. A point of some interest to me on the former journey was the extraordinary amount of restaurant car business done; in addition to the restaurant car itself, tables were laid in no less than *eighteen* adjacent compartments, and even then a second sitting had to be served in the car. At least 150 people must have taken lunch, and the car "crew" must have had an unenviably strenuous time.

Time-keeping seemed a somewhat easier matter on the up journeys. The only one in which a "736" figures was made on the 4.41 p.m. *ex*-Southampton West, in which No. 739 appeared as pilot to No. 430—a superheated 4-4-0 of the penultimate Drummond type. By comparison I give a second run in which No. 430 figured alone on the same train, and a further run by No. 469 of the "463" series, on the 2.40 p.m. non-stop express to Waterloo. In the first two cases the loads were 10 bogies and two "sixes," weighing 275 tons full, and in the third two bogies less, or about 230 tons, all the stock being non-corridor. We passed Eastleigh, 5·7 miles, in 9¼ and 11 min. and 8 min. 55 sec. respectively, the speeds here, before commencing the long 1 in 250 ascent to Litchfield, being 50, 42½ and 49 m.p.h. Before Winchester No. 430 and No. 469 both suffered bad p.w.r. checks, the times to Winchester, 12·6 miles, being 18¼ min., 23 min. 5 sec. and 18 min. 50 sec., to Micheldever, 21·1 miles, 30¼ and 37 min. and 31 min. 50 sec.; and to Litchfield, 23·1 miles, 33 min. 5 sec., 39 min. 40 sec., and 34 min. 40 sec. The speed of the piloted train on the ascent varied from 40 to 45 m.p.h.; No. 430, unaided, recovered from the Winchester slack to 43 m.p.h.—an excellent piece of work—while the rate of No. 469 fluctuated between 42½ and 38 m.p.h. In the latter case the driver appeared to have notched down near Waller's Ash in order not to gain too much time. All three trains suffered a p.w.r. slack between Litchfield and Worting, and the first and third, in addition, slacked severely over the junction; the times to Worting were 42 min. 50 sec., 48 min. 5 sec., and 44 min. 50 sec., and to Basingstoke, 46 min. 10 sec., 50 min. 35 sec., and 48 min. 25 sec., against a schedule of 48 min. The 14·4 miles from Basingstoke to Farnborough took 16¾ min., 16 min. 35 sec., and 15 min. 40 sec.; the 8·9 miles on to Woking, 10 min. 25 sec. in the first two cases and 10¼ min. in the third; and the 10 subsequent miles to

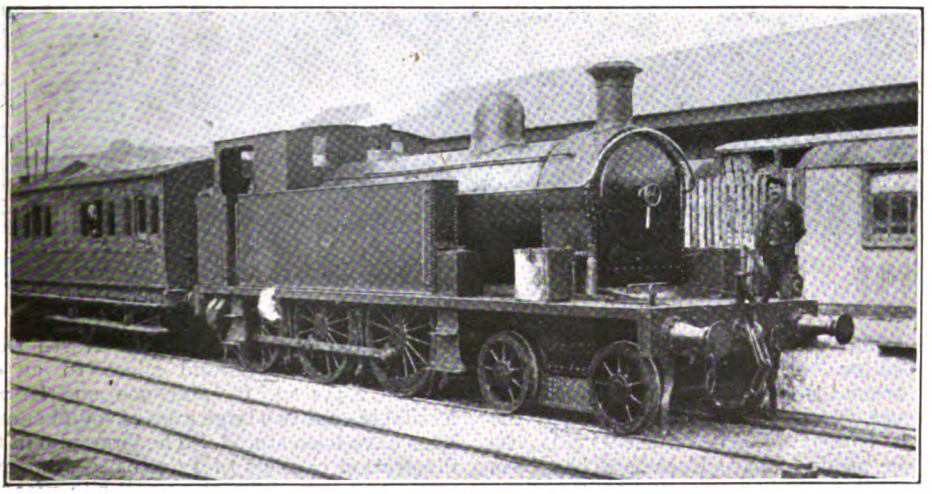


Photo.] [*D. B. Bradshaw.*

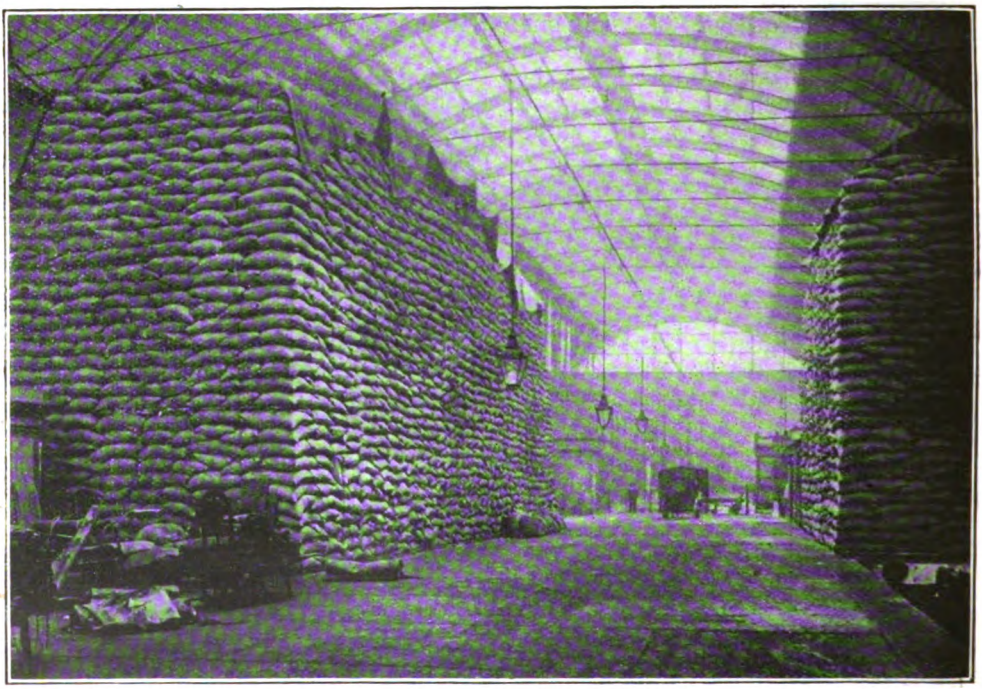
CORK, BANDON AND SOUTH COAST RAILWAY.

4-6-0 tank engine No. 11 at Cork.

Digitized by Google

Esher, 10 min. 25 sec., 9¾ min., and 10 min. 50 sec.—total, 83¾ min., 87 min. 20 sec., and 85 min. 10 sec. for the 64·9 miles from Southampton. No. 430 reached Surbiton, 67·2 miles, in 90 min. 25 sec., or rather under 86 min. net; while the time of the piloted train, stopped twice by signal at and beyond Hampton Court Junction, was 92 min. 55 sec., or 85 min. net; schedule is 91 min. The non-stop train passed Surbiton in 87¾ min., and, but for subsequent delays would have reached Waterloo well inside time; net time from Southampton was about 102 min., or 4 min. under schedule, and that despite rigidly restricted downhill speeds, at no point exceeding 60 m.p.h. I trust that when next I have the pleasure of travelling on this line, so noted in the past for its achievements in the realm of speed, these hampering restrictions will no longer require to be in force.

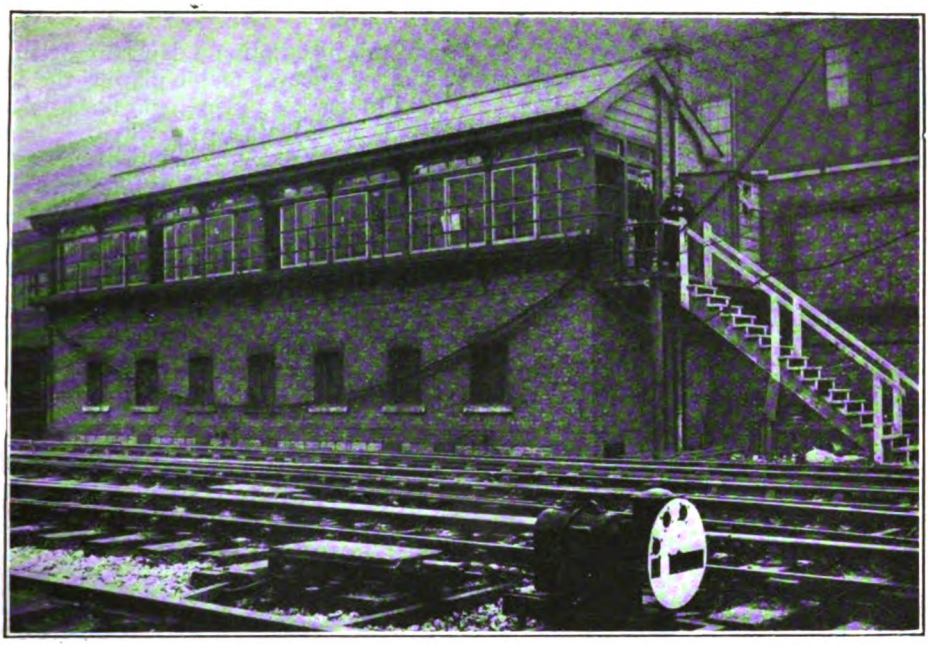
Emergency Storage Accommodation at Hull: North Eastern Railway.



SOYA BEANS STORED AT PARAGON STATION, HULL.

IN order to amplify storage accommodation at Hull, premises in and around the Paragon passenger station, the emigrants' waiting shed, and the Walton Street shed have been made use of, while ground space elsewhere has been employed for storing soya beans, the difficulty to be surmounted applying particularly to increased imports of these, together with wool, linseed, cotton seed and similar articles. At the North Dock Paragon Station ground space to an extent of 2,552 sq. ft. and 900 sq. ft. was available, and two large piles of soya beans in bags have been stored. The large pile in the illustration consists of 12,500 bags or equal to 1,050 tons, whilst the small pile of 3,600 bags amounts to 300 tons. The piling was caried out with the aid of special electrical appliances.

Digitized by Google



NEW SIGNAL CABIN : VICTORIA STATION, SOUTH EASTERN & CHATHAM RAILWAY.

Three-Position Signalling at Victoria:

SOUTH EASTERN & CHATHAM RAILWAY.

FOR some years the three-position signal has been steadily growing in favour abroad; but hitherto, except for one or two isolated signals, the only installation of special note on railways in the United Kingdom has been that adopted by the Great Central Railway in connection with the Keadby bridge and deviation line. Now, however, we have to record the complete equipment of a London terminal station—Victoria, South Eastern and Chatham Railway—with signals of this type, the installation being, moreover, of a comprehensive and notable character and involving the re-equipment of the whole system of signals and points on a power basis.

In view of the increasingly heavy suburban traffic and the fact that some 650 train movements are required every 24 hours, it had become obvious that mechanical signalling would not allow of the necessary speeding up of traffic, and therefore it was decided to remodel the whole system of signalling, from Grosvenor Road into Victoria, adopting all-electric working with upper quadrant three-position semaphore and corresponding dwarf signals for shunting and incidental train movements.

The whole of the signalling and point movements are concentrated in a new signal cabin which replaces two cabins of the old type; one interlocking frame supersedes the two manual frames previously used. The new frame is fitted with special dip standards extending below the floor level, this extension being essential to provide accommodation for five tiers of locking boxes, as the original type of frame was designed to carry three tiers only. Signals are controlled in their 45 deg. and 90 deg. positions by track-circuits and by the signal in advance, while single arms working in conjunction with illuminated route indicators are used where considered desirable. Shunting signals are fitted with a revolving disc, on which a signal arm operating to three-positions is painted, and these are con-

Digitized by Google

trolled by track-circuit in the 90 deg. position only. The night indications for all signals are—red for "stop"; yellow, "proceed but be prepared to stop at next signal"; and green, "all clear, next signal is off."

The locking frame is equipped with 200 levers, as follows:—107 levers for signals, indicators and releases; 47 levers for points; 2 levers for scotch blocks; 1 lever for bolt block; 43 levers for spares for extension.

In the unit lever system one lever is used for each function, that is to say, in the case of a crossover road two lever slides, one for each end of the crossover, are coupled together and operated by one lever handle. With this arrangement two lever slides are moved simultaneously, and the dynamic current, which is generated by the over-run of the motor, frees the check lock on each slide upon the completion of the movement of each pair of points. An advantage gained by this method of operation is that the wiring is standardised as far as possible and simplification results. In addition, each circuit is provided with perfect cross protection.

In this installation a departure from the usual practice of metal plating the lever handles has been made, and black enamel has been substituted. On the handle proper the horizontal portion of the casting is red for signals, black for switches; levers having special functions, such as bolt-locking, are blue, as in standard South Eastern and Chatham Railway practice. Shunt signal levers are distinguished by a white band. The circuit controller, with which each lever is equipped, is provided with a maximum of three tiers of contacts, three normal and three reverse independent contacts. The space required for each unit is 2 in.

GANTRY CARRYING THREE-POSITION SIGNALS (ONE IN 45° POSITION), OTHER SIGNALS BEING OF ORDINARY TYPE.

Above each lever is mounted a combined electric lamp case and number plate designed to be at an angle which renders it readily visible to the person operating the levers. The lamp is used as an adjunct to electric locking and to give an indication as to whether or no the lever can be moved.

All lines in the interlocking area are equipped with track-circuits, the conditions of which are indicated on a diagram situated above the interlocking frame. These control locks on the point and signal-

Digitized by Google

operating levers, and also cause the arms of running signals to be returned to the stop position when the section they govern is entered by a train or vehicle. By their use facing point lock bars are eliminated, route and section locking being substituted.

Direct current is supplied to each track-circuit through independent leads, lamp resistances and fuses from a central battery, the terminal voltage of which is 12 volts. G.R.S. model 9 D.C. 4-ohm. relays are used in all track sections. Line relays of the same general type, but with resistances of 1,500 ohms are used on the 20-volt circuits, and on circuits carrying 110 volts, 1,500 ohms, with an additional external resistance of 4,000 ohms.

The power house is a single-storey building built of brick to match the cabin, and is situated some 20 ft. south of it. It is divided into two parts by air-tight doors, in order that fumes from the accumulators, which are contained in one room, shall not affect the switchboard or the gas engine contained in the room adjoining.

Current at 400 volts is obtained from the Westminster Supply Company's mains and is used to operate two motor generators situated on the lower floor of the signal cabin. These motor generators are available for either charging the accumulators or for supplying current at 110 and 10 volts direct to the interlocking frame or track-circuit switchboard. A 7½-h.p. Mawdsley motor-generator set at 165/100 volts with an output of 30 amps. supplies the main operating current for charging a set of Tudor accumulators. A 7½-h.p. Mawdsley M.G. 35/10 volts giving 100 amps. is utilised for charging the track-circuit accumulators and low-tension auxiliary circuits such as locks, indicators, &c.

PLATFORM STARTING SIGNALS AND INNER UP "STOP" SIGNALS.

The auxiliary power supply consists of a Pelapone gas engine developing 14 b.h.p. at 850 revs., to which are coupled :—

1 generator 165/100 = 30 amps.
1 generator 35/10 = 100 amps.

The battery room contains : For the supply of current to the interlocking frame, 1 set of 60 cells—Tudor accumulators, having a capacity of 350 A.H., and for the current supply to track and auxiliary circuits there are two sets of 12 cells of the same type, with a capacity of 800 A.H.

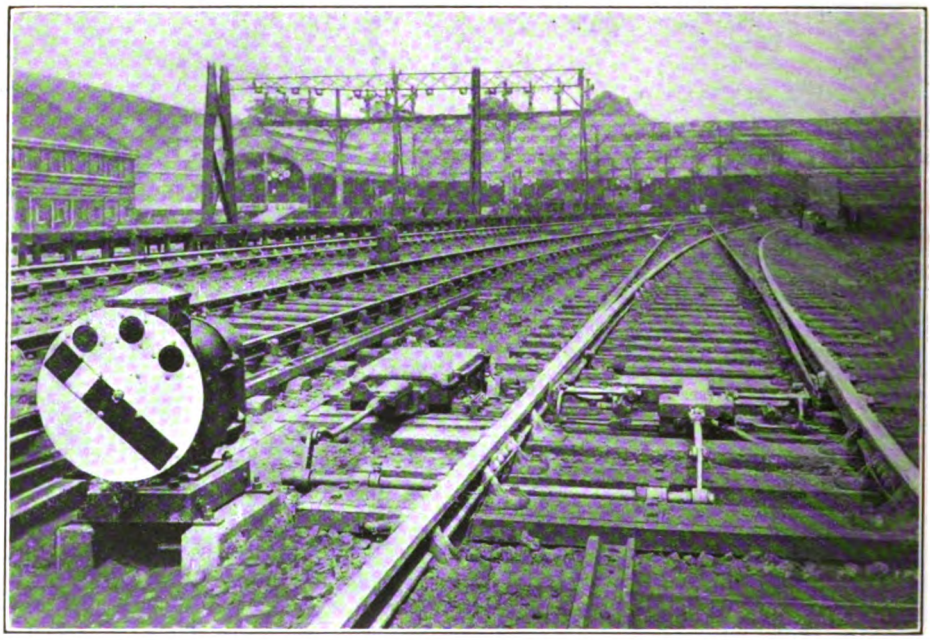
Digitized by Google

Points are operated by G.R.S. model 4A 110-volt D.C. mechanism, with the addition of a specially-designed facing-point lock with combined switch tongue and plunger detector, all contained in a substantial case which is secured by turned set screws to the tie plate. The point indication is dynamic, and the permanent detection current for operating the detection relays passes through lock plunger and point detectors, ensuring that the points are up against the stock rail and locked in the proper position. The detector relays are of the British Power Railway Signal Company's enclosed interlocking type. Route locking by track-circuit is used in substitution of facing point lock bars on all switches.

A feature of the installation at Victoria is the provision of a geographical manipulation chart for the use of signalmen. This chart takes the place of the usual labels on the signal levers. On this signal lever numbers are placed in columns and arranged as nearly as possible according to the geographical position of the signals on the plan. Victoria being a complicated station, special tables have been devised for different classes of work. Thus there are tables for up-passenger, down-passenger, up-shunting and down-shunting.

These tables give the number sequence of lever to be moved for each movement. The diagram is so prepared that straight road movements are emphasised by a more or less continuous straight line, and for deviations from the straight line or road "right" or "left" are shown in a relative manner right or left. All run rounds are therefore easily ascertained by following the direction of the lines.

Viewed from a traffic point of view, the benefits to be derived from the use of three-position signalling are very considerable. The necessary substitution of a yellow light for the usual red one, in the case of a "Distant" indication, is becoming recognised as a good feature, especially where high speed views of signals at a long distance are not involved, as on express sections of main lines. On the mechanical side an important advantage is that one signal mechanism is used to operate each arm to three positions as against two mechanisms to operate two arms to two positions. The number of signals is considerably reduced, which



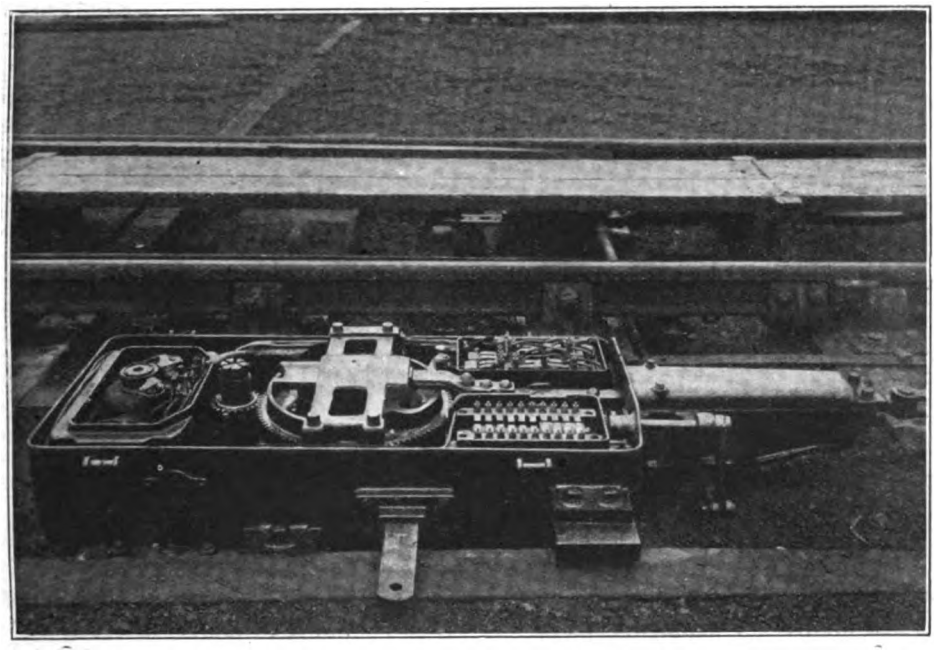
DWARF SIGNAL GIVING 45° INDICATION.

Digitized by Google

means that there is a smaller number of mechanisms to be maintained, and in the case of the distant signal there is the further advantage that the three-position method conveys a more definite instruction to the driver than the usual indications. The use of three-position signalling in congested areas also has the merit of allowing following trains to keep moving, as it permits of working more or less on the principle of repeating the next signal ahead, instead of keeping to strict "distant" signal operation.

Further advantages are found when the three-position principle is applied to dwarf or shunting signals. In the case of those in use at Victoria Station, where track-circuit is general throughout the inter locking area, the signalman can move the arm to the 45 deg. position regardless of the track-circuit, the 90 deg. position following automatically if the track-circuit which it governs is unoccupied, and the signal immediately ahead is in the 45 deg. or 90 deg. position. The signalman can, of course, replace the signal to "Stop" from either position at will. It will, therefore, be seen that, for shunting into an occupied section of track for the purpose of attaching a vehicle to a standing train, the signal can move only to the 45 deg. or "Caution" indication. Similarly, the arrangement is such that this indication only is given in connection with short sidings or dead ends.

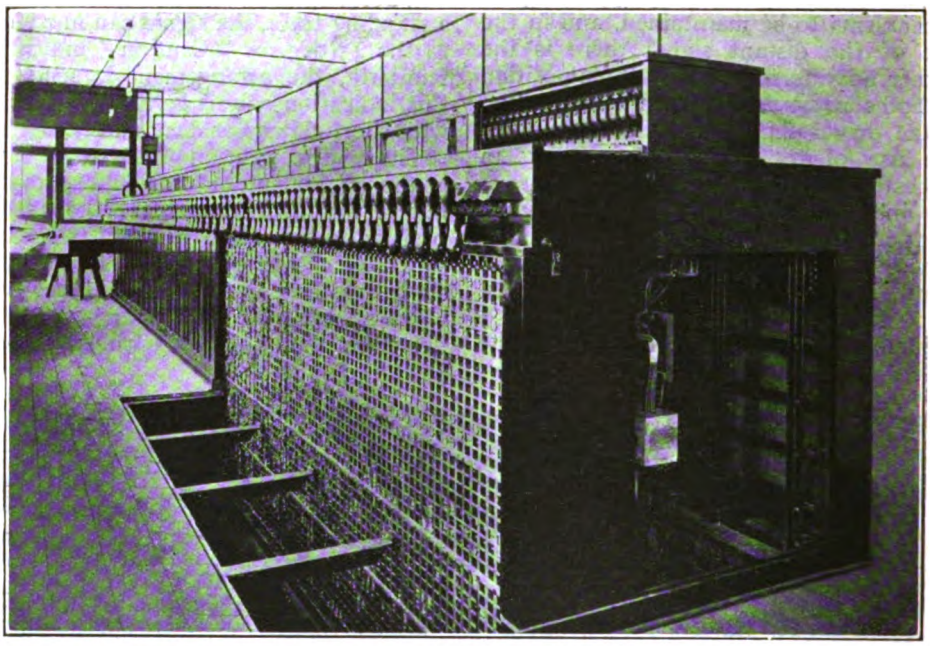
The 90 deg. position of the dwarf signal is the equivalent of that in use to-day, but it will be realised that the 45 deg. position gives quite a new and useful signal which can be used in place of hand signalling, and possessing all the advantages afforded by interlocking and point detection. Most large terminals to-day are taxed to the limits of their capacity, and any safe method of speeding up shunting operations by giving confidence to drivers, who, with the three-position method, can perform their engine movements in accordance with signals giving exact information, should give good results.



ALL-ELECTRIC POINT MECHANISM.

For the information on which this article is based we are indebted to Mr. P. C. Tempest, Chief Engineer, South Eastern & Chatham Railway. We would also like to acknowledge the assistance received from Mr. E. C. Irving, Chief Engineer, British Power Railway Signal Company,

Digitized by Google



INTERLOCKING FRAME FOR ELECTRICALLY OPERATED SIGNALS, VICTORIA STATION, SOUTH EASTERN & CHATHAM RAILWAY.

who designed the installation, and Mr. E. W. Hallam, Assistant Signal Superintendent, South Eastern & Chatham Railway, from whose photographs most of the accompanying illustrations have been prepared.

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. L. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Nov., Dec., Jan., Feb., April, June, July, and Aug. out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)
NORTH EASTERN; Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan., Feb. and May, 1917, out of print.)
SOUTH EASTERN: June, July, Aug. 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918. (Jan. out of print.)
CALEDONIAN: March, April, May, June, 1918.
LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)
MIDLAND: May, June, July, Aug., Sept., Oct., Nov., Dec., 1919. Jan., Feb., 1920.

All parts still in print are One Shilling each.

In "Railway Magazine," April, 1920, Mr. Ahrons will commence a series of articles on the North British Railway.

Digitized by Google

A Remarkable 2-8-8-0 Simple Articulated Locomotive: Pennsylvania Railroad.

MOST of the big articulated locomotives used in the United States are of the compound Mallet type, but the Pennsylvania Railroad has recently placed in service a remarkable 2-8-8-0 engine of the same class, wherein all cylinders use high-pressure steam. This engine is illustrated as frontispiece and is remarkable because of the notable dimensions set forth below, while the arrangement of certain details constitute radical departures from what is generally regarded as orthodox design.

The following are the leading dimensions

Cylinders(4)	30½ in. diam.; 32 in. stroke.
Coupled wheels	5 ft. 2 in. diam.
Leading wheels	2 ft. 9 in. diam.
Steam pressure (designed for 225 lb.)	205 lb.
Firebox	13 ft. 10 in. length by 8 ft. wide.
Tubes: Number and outside diameter	137 (2¼ in.)
Flues: Number and outside diameter	284 (3¼ in.).
Superheater tubes: Number and outside diameter ..	568 (1⅛ in.).
Tubes and flues: Length ..	19 ft.
Heating surface of tubes and flues	6,125 sq. ft.
Heating surface of firebox ..	531 sq. ft.
Heating surface: Total ..	6,656 sq. ft.
Superheating surface	3,136 sq. ft.
Grate area	112 sq. ft.
Wheelbase (driving)	45 ft. 2½ in.
Wheelbase (rigid)	17 ft. 1½ in.
Wheelbase, total	54 ft. 8½ in.
Wheelbase, engine and tender	97 ft. 3¼ in.
Coupled length	105 ft. 9¼ in.
Height, extreme	16 ft.
Tractive effort..	135,000 lb.
Weight in working order ..	256 tons
Weight of engine and tender in working order	355 tons.

As usual in the Mallet type the rear coupled wheels are carried by the main frames, while the leading coupled and truck wheels are mounted in a hinged frame with suitable bearing arrangements for the front portion of the boiler, together with steadying and centreing fittings. Special steam connections lead both series of exhausts to the smokebox and supply steam to the respective cylinders. The firebox is of Belpaire type this feature extending partly along the barrel to form a combustion chamber 12 ft. long. A conical boiler ring adjoins the barrel, outside diameters being 8 ft., 8 ft. 11⅜ in. and 9 ft. 2 in. respectively. A Duplex stoker and other special fittings are provided.

There are four drop grates, of the usual Pennsylvania Railway finger type, operated from a shaft attached to the rear of the foundation ring. They are divided, for shaking, into four sections, and are operated by a Franklin steam grate-shaker, but may be operated by hand should this device fail. The boiler is designed for 225 lb., but carries only 205 lb. pressure at present. It is protected by three standard 5-in. Coale muffled safety valves, mounted on the roof plate over the combustion chamber.

Steam distribution to the cylinders is effected by Walschaert valve gear, so designed that the maximum cut-off is 50 per cent. of the stroke. To offset the rather slow building up of pressure in the cylinders at the beginning of the stroke, due to the use of a 2-in. steam lap, an auxiliary port, which opens in advance of the main valve openings, is employed.

Two 16 in. diam. by 12-in. stroke air brake cylinders are used on each engine, and secured to cross braces between the frames, each cylinder operating the brakes on two pairs of drivers.

The engine was designed by Mr. J. T. Wallis, General Superintendent of Motive Power, and built at the Juniata shops.

Digitized by Google

ENTRANCE TO GRAN VIA STATION.

The First Underground Railway in Spain.

FOR several years past the increasing congestion in the central districts of Madrid had given rise to proposals for a subterranean railway, but it was not until May, 1914, that a practicable proposal was submitted to the Government. The concession was eventually granted on January 12, 1917, and covers four sections, of which the first, between the Puerta del Sol and Cuatro Caminos, was officially inaugurated on October 17, 1919, by King Alfonso XIII.

Work was started on July 10, 1917. In the six outer stations, which are near street level, access is by staircases, while at the Puerta del Sol and Gran Via lifts are to be provided. The stations, and indeed the whole of the installation, closely resemble the Paris "Metro," and in the same way the line follows the directions of the main streets and at no point is there any excavation under existing buildings.

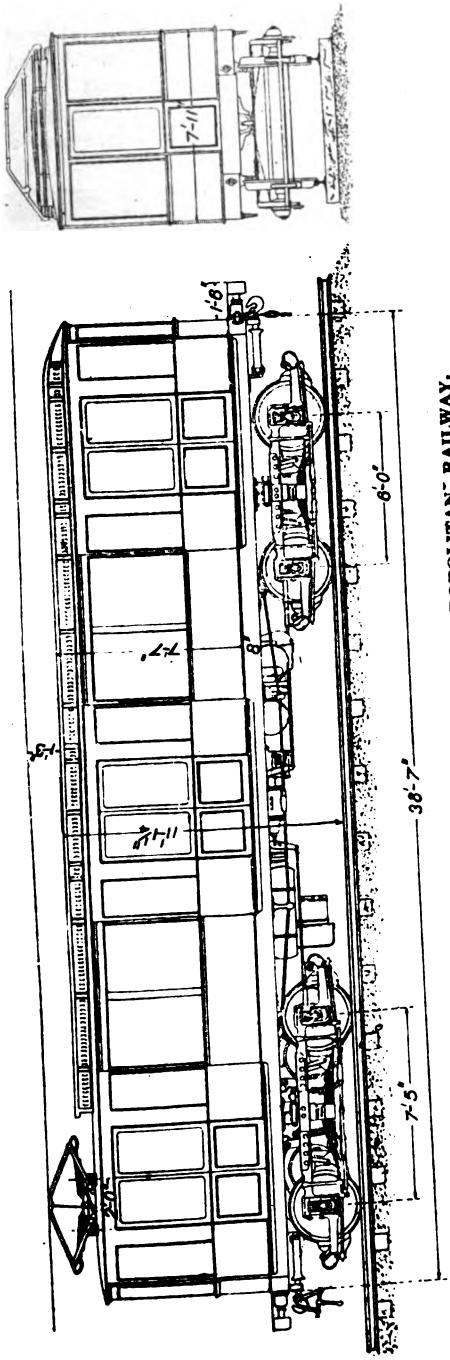
Stations are lined with white and coloured tiles. The maximum gradient is 1 in 25 and the maximum curvature 300 ft. There is double track throughout, the gauge being 4 ft. 8½ in.

Transmission is at 550 volts from an overhead conductor through pantograph collectors. Current is supplied through six sub-stations by the Madrid Electrical Union. In addition the Metropolitan Company have installed a battery of Tudor accumulators affording a reserve sufficient to keep the service running for one hour in case of breakdown.

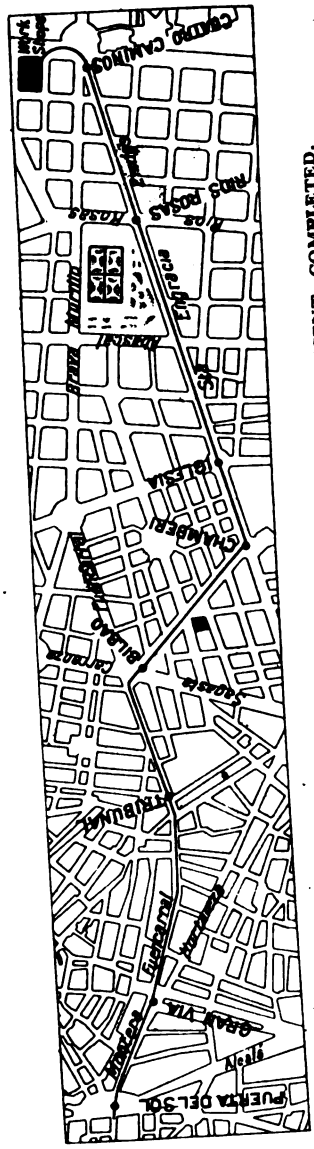
Lighting is principally taken off the main supply, and there are 16-c.p. lamps all along each side of the tunnel, 25 metres apart and "staggered." Stations are lighted by nine lamps of 100 c.p. on each platform or 1,800 c.p. for each station. In addition to the light from the main supply there are connections at 110 volts from an independent city light supply, so that the breakdown of the main supply would not leave tunnels and stations in darkness.

Signalling is on the Hall system and entirely automatic, red and white lights being used for "stop" and "proceed,"

Digitized by Google



PASSENGER CAR MADRID METROPOLITAN RAILWAY.



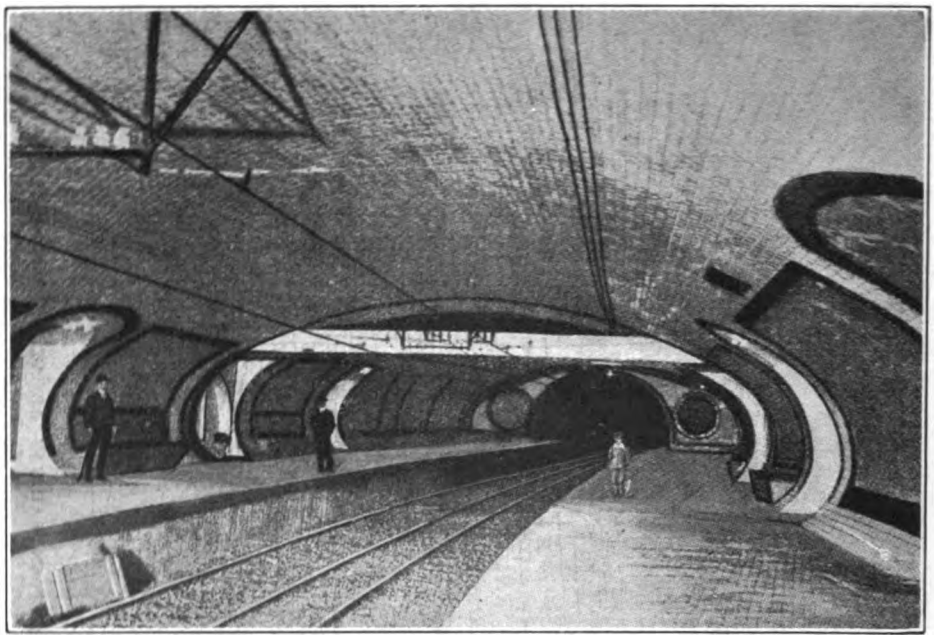
PLAN OF MADRID METROPOLITAN RAILWAY AS AT PRESENT COMPLETED.

Digitized by Google

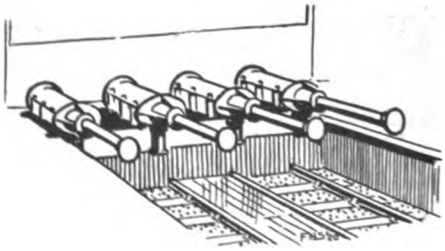
operated by means of treadles depressed by the vehicle wheels.

The carriages are of two classes, first and second. Bodies are wholly of steel and, therefore, absolutely fireproof. With white enamel inside and rattan seating these vehicles have the advantage of being easily cleaned and disinfected. The stock at present consists of 11 motor coaches and 10 trailers. Each carriage has three sliding doors at each side, automatically opened and closed. There are 24 seats, but there is space for 76 persons seated and standing. Both motors and trailers are 41 ft. long over buffers by 7 ft. 10½ in. wide, and 11 ft. 1 in. high from rail level. Interior lighting is by ten 50-c.p. lamps, and each vehicle carries a set of accumulators in case of breakdown of the main supply.

Tickets are printed as issued, and there is one fare for any distance, the amount being at present 15 centimes, third class (roughly 1½d.). At present each train consists of one motor coach and one trailer, but station platforms will accommodate trains of five units. When the traffic reaches its normal level, it is proposed to run a train each way every three minutes during the busy periods. The run of 2½ miles up to Cuatro Caminos takes 10 minutes, and the return, down grade, only 8 minutes, including three stops.

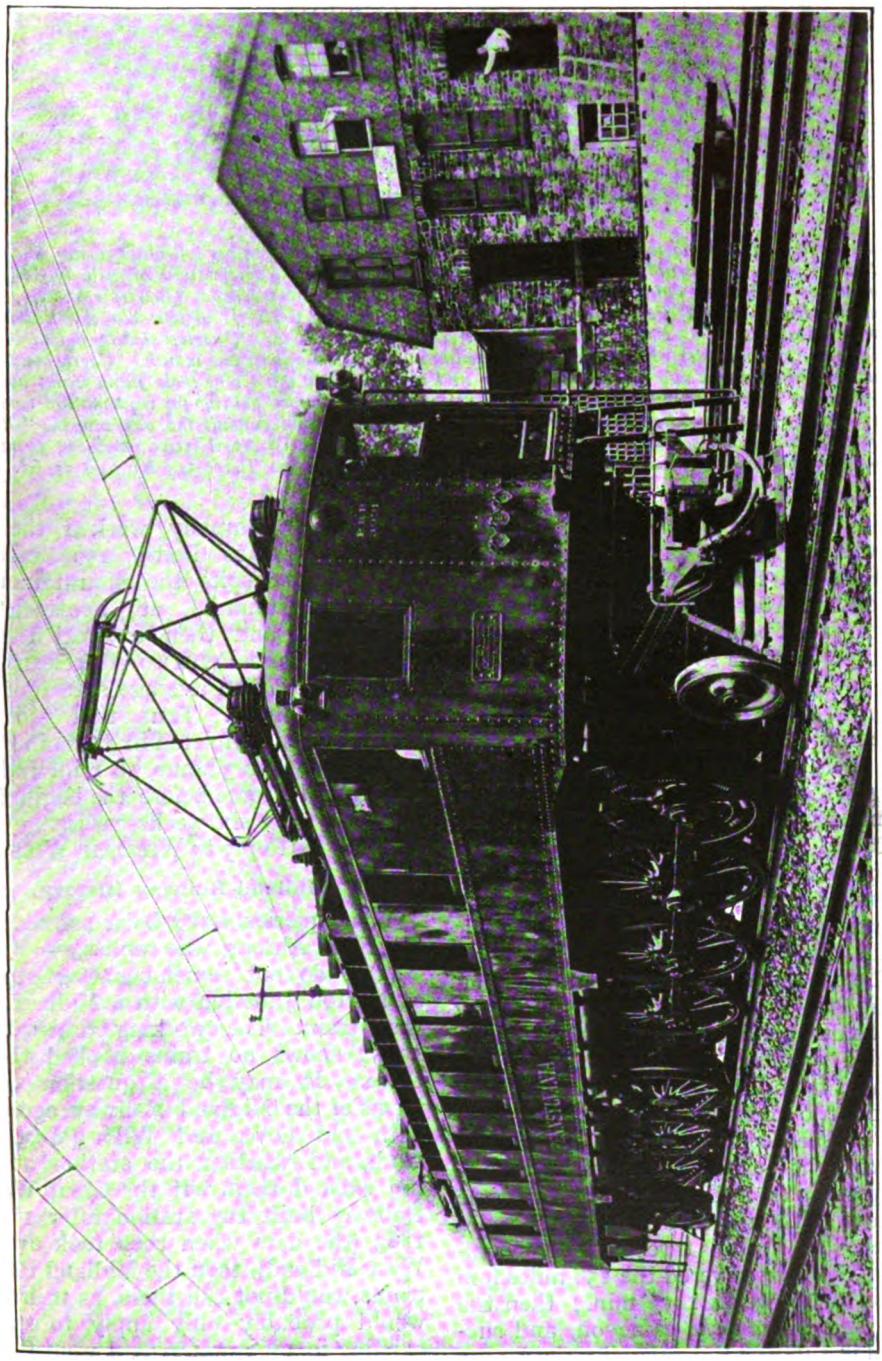


INTERIOR OF PUERTA DEL SOL STATION.



Digitized by Google

250-TON ELECTRIC LOCOMOTIVE, PENNSYLVANIA RAILROAD.



This is claimed to be the most powerful locomotive in the world for freight haulage. It has a maximum accelerating horse-power of 7,600, and a sustained horse-power capacity of 4,800 for one hour. With two of these engines a 6,300-ton train can be handled at a speed of 20·6 miles per hour on a 25-mile 1 per cent. grade.

Digitized by Google

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, 30 *Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which, published in April, 1919, is out of print but a new one is in preparation, in readiness for publication in April, 1920. Price 5s., By post 5s. 6d.*

The Race to Aberdeen

It was on August 21st, 1895, that the best East Coast times were made between London and Aberdeen in this famous race. With 105 tons behind the tender, a Stirling "8-footer" ran the 105½ miles from King's Cross to Grantham in 101 min.; another engine of the same type covered the succeeding 82¾ miles to York in 76 min. From there a North Eastern 4-4-0 ran to Newcastle, 80½ miles, in 78½ min., and the ensuing stage of 124½ miles to Edinburgh was reeled off by a second 4-4-0 in the extraordinary time of 114 min.—average 65·5 miles per hour. The North British Company ran the train on over their difficult 59¼ miles from Edinburgh to Dundee in the even hour, and the concluding 71¼ miles to Aberdeen, includng a considerable stretch of single line, occupied 77 min. Inclusive of stops, the 393 miles from London to Edinburgh were covered in 6 hours, 18 min., and the 523½ miles to Aberdeen in 8 hours, 40 min.

Next night—the last night of the race—the West Coast authorities beat this time by 8 min., although their route is 16½ miles further. A Webb three-cylinder compound, *Adriatic*, covered the 158 miles fom Euston to Crewe in 147½ min.; then the little 2-4-0 *Hardwicke* came on, and succeeded in running the 141 miles right over Shap Summit into Carlisle in the amazing time of 126 min. at an average speed of 67·2 miles per hour. From Carlisle the Caledonian Company worked the train with a 4-4-0 to Perth, 150¾ miles, in 149½ min., despite the mountainous intervening summits at Beattock and Gleneagles, and then covered the final 89½ miles from Perth to Aberdeen in 80½ min., again at an average speed of 67·2 miles per hour. Thus the 540 miles journey was completed in 512 min! This was no less than 3 hours, 18 min. under the best time in force before the beginning of the race, only six weeks earlier.

[Reply to WILLIAM WILSON.]

Midland Railway History.

Your queries have been submitted to Mr. E. L. Ahrons, who replies :—

(1) I do not remember ever stopping at Norton Junction with a Midland Railway train. The working time-table of 1905* shows no trains booked to stop there. It may be a question of the terms of the Midland Railway agreement with old O.W. and W.R. (West Midland), and whether the station at Norton existed then. If the Great Western Railway built the station after 1862 or 1863 (the date when they took over the West Midland), then the Midland Railway trains would not call there, as their rights would probably only apply to stations existing in 1862 or 1863. I went through Norton on October 3 last during the strike

* My older working time-tables were accidentally destroyed when I was in Egypt.

Digitized by Google

in the only slow train in the day from Gloucester to Birmingham, and we omitted to stop at Norton. Fernhill Heath may have existed in 1863, but I do not know. If it did not, then the Midland Railway trains (only a few) stop by special arrangement with the Great Western Railway, probably for the convenience of the public to convey business residents into and out of Worcester.

(2) I do not think any passenger trains run over the Towcester-Olney section. I remember often wondering when they were going to start. At the same time I cannot make a definite statement that there have never been any. At one time the Midland ran through goods trains—about two each way—with their own engines, between London and Gloucester, but the engines were too heavy for the East and West Junction line, and the latter bought three London and North Western "DX" class to work these trains between Olney and Broom Junction.

[Reply to "CHELTONIAN."]

London-Carlisle Non-Stop Runs.

On the occasion of a visit of delegates of the International Telegraph Conference to Glasgow on June 19th, 1903, a special train, consisting of 10 twelve-wheeled dining cars and 2 eight-wheeled vehicles (about 470 tons), was run non-stop from Euston to Carlisle. The engines were both 4-4-0 four-cylinder Webb compounds—No. 1965, *C. H. Mason* and No. 1966, *Commonwealth*. A time of 5 hrs. 56 min. was spent on the down journey, and of 6 hrs. 2 min. on the up journey, which was also made non-stop three days later. The distance is 299 miles, and had previously been covered non-stop, some years before, by the Webb three-cylinder compound *Ionic*. On the down journey, referred to above, a time of 5 hrs. 50 min. to Carlisle could easily have been achieved, as the train passed Shap Summit 10 min. early, but the engines were eased from that point in order to avoid too early an arrival.

[Reply to "WATT."]

Mail Trains, Great Northern Railway.

There are now only four expresses on which sorting carriages are conveyed by this route, viz., the 4.55 a.m. from King's Cross to Leeds, the 11.15 a.m. ex-Leeds, due in London at 4 p.m., the 8.25 p.m. from King's Cross to Edinburgh, and the 2.25 p.m. up, leaving Newcastle at 7.15 p.m., and due in London at 4.30 a.m. The last-named is a special mail and parcel train south of Doncaster. It is for interchange mails between Great Northern, North Eastern and North British intermediate stations that the Edinburgh sorting carriages are principally intended, as the bulk of the postal traffic from London to Scotland is conveyed by the "West Coast Postal" from Euston at 8.30 p.m., while the North-East Coast traffic goes by the Midland and North Eastern Joint Postal Service from St. Pancras at 8 p.m., via Derby, Sheffield, Normanton and York.

[Reply to "EAST COAST ENTHUSIAST."]

Locomotive Histories.

The following works deal exclusively with the locomotives of a single railway on a historical basis:—"Locomotives of the North Eastern Railway," by J. S. MacLean; "Locomotives of the Great Northern Railway" by G. F. Bird; and "Locomotives of the London Brighton and South Coast Railway." There are also smaller publications such as "Behind the Highland Engines," and "Locomotives of the Isle of Wight Central Railway." So far as we know, no other books have been published dealing exclusively with the locomotives of any one company. As regards the more modern locomotive types, illustrations with full dimensions of the bulk of them have appeared from time to time in the RAILWAY MAGAZINE. We do not answer queries relating to dimensions, etc., See rules.

[Reply to "DERBY" and P. E. WALKER].

Old Signal-box at St. Pancras.

Your enquiry evidently relates to the original signal-box of the station, which stands at the North end of the turn-table siding. It is a structure with a brick base and was obviously constructed with a view to harmonise with the architectural character of the station building. We have ascertained that the box was out of use in 1873, and there is no doubt it was superseded by the erection of the first St. Pancras Junction Signal-box. The site would hardly appear to be suitable for a signal-box after the introduction of block working. The lower part of the building is now used by the carpenters and brick-

Digitized by Google

layers attached to the Way and Works Department, and the upper part by the Construction Section of the Telegraph Department.

[Reply to "SINGLE WHEELER."]

London and North Western Railway Engines.

On the subject of your letter Mr. C. Williams, Crewe, writes:—Of the classes mentioned the number of engines at present in service is as follows:—"DX's," 116; "Cauliflower," 308; "Coal Engine" 228; "Saddle Tanks," 334; and about 150 of the R.O.D. type. As regards the latter the numbers in the London and North Western list run from 2800-2949—150 in all—but so far only 146 have been received, and there is only one more to come, the remaining three having been cancelled. Doubtless the latter will be made good later. Three new engines of the "Prince of Wales" class will shortly be running, Nos. 35, 487 and 1178. Another will be No. 395.

[Reply to L.N.W.R.]

Great Southern and Western Railway, Ireland.

It is very difficult to decide on any English main line which exactly reproduces the grading and other difficulties of the Great Southern and Western Railway of Ireland. The nearest parallel that we can think of is the Great Eastern Colchester main line, from London to Norwich. In this case the aggregate grading difficulties would be about the same, although the Great Eastern Railway performance is considerably the more hampered on account of curves, many of which compel severe service speed reductions. There are no service slacks on the Great Southern and Western Railway between Dublin and Cork.

[Reply to J. A. DANE.]

Mansfield-Sheffield Service.

It is by special arrangement between the Great Central and Midland Railways that the trains from Sheffield (Midland) to Mansfield *via* the Sheffield District Railway, Treeton and Langwith Junction are composed mainly of Great Central Railway stock, but worked with a Midland engine, for mileage purposes. From Sheffield to Brightside Junction, Treeton Junction to Beighton Junction and Langwith Junction to Mansfield the route is Midland, but the remainder forms part of the old Lancashire, Derbyshire and East Coast Railway, now absorbed by the Great Central Railway.

[Reply to "MANSFIELD."]

Midland Railway Locomotives.

We cannot agree that the absence of 4-6-0 locomotives on this railway has any connection with the easier passage of 4-4-0 engines over curves than of 4-6-0 engines. With such curves as are found on any average main line of railway the difference between their relative effects on the performance of the two types would be so small as to be negligible. Further, there are several companies whose main lines are far more sharply curved than that of the Midland Railway, which make use of 4-6-0 engines for express work. The other reply to which you refer did not appear in this magazine.

[Reply to "DRIVING-WHEELS."]

Speed Restrictions, Great Western Railway.

All up trains are required to reduce speed to 30 m.p.h. through Westbourne Park Station, and up and down trains to 40 m.p.h. through Bridgend Station (East end); west of Carmarthen Bridge on the Fishguard line, the restrictions are: over curves near Wolf's Castle, 275¾ to 277 miles, all trains, 50 m.p.h.; through Letterston Junction, all trains, 45 m.p.h.; between Manorowen and Fishguard Harbour, all trains, 40 m.p.h. We fear we cannot afford the space to detail the numerous restrictions between Exeter and Penzance.

[Reply to R. P. ANGUS-LEWIS.]

The "Crow" as a Shunting Whistle.

A "crow" is largely used as a shunting whistle signal as it is distinctive from other code whistles. Sometimes ordinary sounds are combined with one or more crows to indicate to a signalman a special requirement. Occasionally a crow is used as a running code whistle, to indicate that an express desires to use avoiding lines at an important station ahead, so that the signalman can telegraph or telephone forward in time for necessary action to be taken. It is also sometimes employed to indicate that assistance is required at the next centre ahead.

[Reply to A. H. B.]

Digitized by Google

4-2-2-0 Express Engines, London and South Western Railway.

No. 369 is one of the early four-cylinder engines designed by the late Mr. Dugald Drummond. These engines have, in effect, two pairs of "single" or uncoupled driving wheels, the inside cylinders operating the leading pair and the outside cylinders the trailing pair, after the style of the Webb three-cylinder compounds, except that these engines are "simples." The series runs from 369 to 373 inclusive, and includes also the pioneer engine No. 720, which has been rebuilt with a larger boiler.

[Reply to "WINTONIAN."]

Uganda Railway.

The fact that the gauge of the Uganda Railway is metre may entail some difficulties when it becomes associated with the 3 ft. 6 in. gauge lines, which are extending northward through Rhodesia. It was determined upon by a Foreign Office Committee in 1895 in order to allow of inter-changeability of rolling-stock with the Indian metre-gauge lines, in case of need, and also because it was understood that the Sudan Railways were to be of this gauge.

[Reply to "ANGLO-INDIAN."]

Connections at Farnborough, London and South Western Railway.

Specially routed passenger trains use the various connections in this area, but the principal value is for goods traffic, much of which uses the Virginia Water route towards London instead of the main line, especially that destined for the northern railways *via* Brentford. When the Feltham Concentration Yard, described last month, is completed this route will be still more widely used.

[Reply to I.N.E.]

"Prince of Wales" Class Engines, London and North Western Railway.

You are correct in assuming these engines to be merely a superheated version of the previous 4-6-0 "Experiment" class. In connection with the superheating the cylinders are enlarged in diameter from 19 to 20½ in., the heating surface is modified, the engine weight slightly increased, and the smoke-box extended, the last-named being the only external difference.

[Reply to "KNOWLE AND DORRIDGE."]

"Somersault" Signals.

Standard on the Great Northern and Taff Vale Railways, these signals are designed so that the arm is balanced about a central pivot, so that accumulations of snow and ice in wintry weather cannot cause a false indication. In addition, lighter balance weights will suffice to ensure return to the "danger position" as the weight of the arm is balanced in itself.

[Reply to R. O. PAGAN, JUNR.]

London and South Western Railway Locomotives.

The 2-8-0 engines recently taken over from the R.O.D. are for the present retaining their numbers, 2069-2072 and 2119-2124, in both cases inclusive. No. 334 is one of the large-boilered 4-cylinder 4-6-0 engines of the first series built by the late Mr. Dugald Drummond. These engines are now used exclusively on goods service.

[Reply to "NINE ELMS."]

Locomotive Exhaust.

There is no connection between the sharpness of a locomotive exhaust and the size and design of the superheater with which the engine may be equipped. Exhaust is sharpened merely by reducing the diameter of the orifice (*i.e.*, the mouth of the blast pipe) through which the steam is passed on the way from the cylinder to the chimney.

[Reply to KENNETH W. H. READ.]

A Nottinghamshire Enquiry.

The tunnel between Annesley Sidings and Kirkby South Junction is the property of the Great Central Railway, forming as it does part of the Great Central Railway main line between Nottingham and Sheffield. By virtue of running powers it is used also by Great Northern trains for the Shireoaks branch, which diverge at the junction mentioned.

[Reply to "MANSFIELD."]

Bogie Shields.

Sheet steel shields are fitted in front of the bogie wheels of the Midland 4-4-0 express engines in order to protect their motion from grit, etc., when they are being piloted, and especially when the pilot is taking water. Presumably the shields to

Digitized by Google

the bogie wheels of the London and North Western 4-4-0 engine *America* serve the same purpose.

[Reply to "WATT."]

4-4-0 Engines, Great Western Railway.

There is no material difference between the "City" and the "Flower" class engines, both of which have 6 ft. 8 in. driving wheels; but the "Bulldogs," which were designed in the first instance for service over the severe grades of South Devon and Cornwall, have only 5 ft. 8 in. wheels.

[Reply to "SOLIHULL."]

Classification Indicators on Great Western Railway Locomotives.

Discs placed on the cabs of Great Western Railway locomotives indicate by letter the load or traffic classification of the engine, while the colour shows that it is permissible for it to be used over particular sections of line where restrictions apply.

[Reply to J.S.C. and "BARRYMORE."]

Gradients, Saltash-St. German's, Great Western Railway.

Steepest gradient on the existing route between Defiance Platform, Saltash and St. German's is 1 in 101, up to Wearde Station. Between Wearde and St. German's there is nothing steeper than 1 in 120. The old route had a number of strips at 1 in 68-81.

[Reply to R. P. ANGUS-LEWIS.]

City and South London Railway.

When the tunnels are enlarged and the line connected with the London Electric Railway new rolling-stock, suited to the increased dimensions will, of course, be introduced, and this will consist of motor and trailer cars as on other tube lines.

[Reply to H. T. CLARKE.]

Bournemouth-Birkenhead Expresses.

Coaches and restaurant cars for these trains are furnished by the London and South Western Railway, but the Great Western Company undertakes the haulage from Birkenhead through to Bournemouth and back, with its own engines.

[Reply to P. E. WALKER.]

Steam Rolling-Stock: Metropolitan Railway.

Electric locomotives are fitted with vacuum as well as Westinghouse brake apparatus, so that steam rolling-stock can be operated on the vacuum system over the electric sections.

[Reply to "COTTER."]

Weight of Rail: Great Indian Peninsula Railway.

Bull-headed and double-headed steel rails on the Great Indian Peninsula Railway are now 100, 82 or 69 lb. per yard. Flat-footed rails, except on light lines, weigh 80 lb. per yard.

[Reply to "ANGLO-INDIAN."]

Locomotive Classification, Midland Railway.

You are correct in stating that the 4-4-0 engines not yet scrapped between the numbers 300 and 327, inclusive, belong to Class 1, while subsequent 4-4-0's up to 562 are in Class 2.

[Reply to "SINGLE-WHEELER."]

Scottish "Record of Records" Run.

We are unable to say what past run in Scotland could lay claim to this title, although we have several in mind that might well do so. But considerations of space prevent us from detailing them.

[Reply to D. B. L. GWYNNE.]

Doncaster-York Section, North Eastern Railway.

Great Northern Railway trains work through, but the local services are provided by the North Eastern Railway, and a few other trains are also worked by the latter company's engines.

[Reply to I.N.E.]

A Locomotive Mystery.

Where names are withheld, as in the reply to which you refer, it should be obvious to you that this is done with a purpose, and that we do not propose to divulge them.

[Reply to H. SIMPSON.]

Train Indicators.

The remark you quote from *Punch* applies to the railway carriage train indicator described in "Pertinent Paragraphs" in the January, 1920, number of the RAILWAY MAGAZINE.

[Reply to S. E. HAMILTON.]

Digitized by Google

Belfast *via* Heysham.

We have no information as to the intentions of the Midland in regard to this route, although the London and North-Western route *via* Greenore, has just been reopened. [Reply to T. C. ADKINS.]

Largest Signal Box: London and North-Western Railway.

Euston No. 2 signal cabin, 288 levers, is the largest on the London and North Western Railway. Crewe South Junction (electric) has 247 levers.

[Reply to "CORNWALL."]

Watford Extension: Metropolitan and Great Central Railways.

Parliamentary powers for this have been granted, but construction has been held up by the war, though it will probably be commenced at an early date.

[Reply to S. E. HAMILTON.]

4-6-0 Drummond Engines, London and South Western Railway.

These locomotives are far from being the most powerful in Europe. We do not know where you can have obtained such information.

[Reply to S. B. MAXWELL.]

The Largest Signal-box.

Full particulars of all the largest signal-boxes are given in the RAILWAY YEAR BOOK. The 1920 edition is in the press, and will shortly be published.

[Reply to "RUGBEIAN."]

4-6-0 Locomotives: London and South-Western Railway.

The new mixed-traffic 4-6-0 class, with 5 ft. 7 in. coupled wheels, is in hand, but the first engine has not yet been completed. [Reply to J. TURNER.]

Buffer-Stop Collision at Crewe.

The engine concerned in the accident on November 17 last was No. 1117, *Vandal*, of the "Precursor" class.

[Reply to "PRECURSOR."]

Engine No. 2299, Midland Railway.

This engine has never been placed in ordinary service, and therefore remains at Derby.

[Reply to "SINGLE-WHEELER."]

Fastest pre-war schedule, London & South Western Railway.

This was from Basingstoke to Vauxhall, 46·5 miles, which was covered start-to-stop in 49 min.—average 56·9 miles per hour.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

A Mysterious Engine on the Midland Railway.

You are probably referring to the ten-wheeled (2-6-2 type) experimental engine No. 2299, which is still extant.

[Reply to H. E. WOOD.]

Highland Railway Locomotives.

Bogie tenders are fitted to the 4-6-0 engines of the "Castle" class.

[Reply to A. A. TORRANCE.]

London and South Western Railway Whistles.

We understand the low-pitched whistle or "buzzer" on No. 463 is experimental.

[Reply to "WINTONIAN."]

R.O.D. 2-8-0 Locomotives (Great Central Railway Design).

Ten of these engines have been taken over by the Caledonian Railway Company.

[Reply to D. B. L. GWYNNE.]

The "Sunny South Special."

We have no information as to the reinstatement of this train.

[Reply to H.R.S.]

Midland Railway Rail Lengths.

Standard length of rail used in relaying on the Midland Railway is one of 45 ft.

[Reply to R. CHARLES FORD.]

Australian Locomotives.

We know of no published books dealing with Australian locomotives.

[Reply to "BOGIE."]

Great Chesterford and Newmarket Railway.

See paragraph on page 366, RAILWAY MAGAZINE, May, 1917.

[Reply to A. de Q. MEARS.]

4-6-0 "Cardean" Class, Caledonian Railway.

All these engines are now superheated.

[Reply to "BOGIE."]

Digitized by Google

PERTINENT PARAGRAPHS

The 1919 Railway Reports.

As we go to press most of the reports for the year 1919 have been issued by the various home railway companies. Owing to the continuance of Government guarantee conditions, the tables of revenue and expenditure are necessarily only partially indicative of the real situation, seeing that the guarantee is for net receipts only, in conjunction with certain adjustments and special features. Therefore, the fact that gross receipts are stated in figures which represent considerable increases upon last year's totals is explained by the corresponding increases on the expenditure side, due to the large additional costs which railway working now has to bear from one cause or another. Consequently, the fact that net receipts usually represent an improvement, and dividends are maintained at the same level, or, as in several instances, increased by nearly all companies, indicate that the outlook for the home railways is, on the whole, regarded as distinctly hopeful. Among the companies declaring an increased distribution of ½ per cent. are the London and North Western, North Eastern, Midland, and South Eastern; the Great Eastern and North British each pay ¼ per cent. more, and the London and South Western a further ¼ per cent. On Chatham second preference stock, 3½ per cent. additional is paid, and the North London rises by ¾ per cent. The Furness, Highland and the allied underground companies involve reductions. Although the reports are still necessarily restricted, as compared with those of 1913, much further data is now given; in fact, the only tables missing are those which obviously cannot be restored while the conditions of Government control and guarantee remain in force.

The Railway Meetings.

At the meetings so far held, many interesting points were brought out in the speeches of the various chairmen, to some of which we hope to refer in greater detail in due course. Thus, at the Great Eastern Railway meeting, the Right Hon. Sir Ailwyn Fellowes, K.C.V.O., K.B.E., Deputy-Chairman (presiding in the absence of Lord Claud Hamilton for the second time only since 1893), referred to the road motor service between London and various points, whereby goods congestion has been materially relieved; and to the difficulties of meeting the peak loads of suburban traffic owing to altered working hours in the industrial world, notwithstanding which, between 5 p.m. and 7 p.m., no fewer than 84 trains are despatched from Liverpool Street for suburban stations, carrying, on an average, about 70,400 passengers. In regard to this traffic, he hoped that reorganisation would shortly enable them to do even more to alleviate the congestion. Sir Henry Thornton is devoting much attention to the electrification of suburban lines, and a scheme is in course of preparation. The new livery for coaching stock—a deep crimson lake—was also mentioned; while arrangements have been made for running Pullman cars on main line services during next summer. Signalling alterations at Liverpool Street, including the adoption of route indication signals for incoming trains, has enabled 65 arms and their lamps to be abolished. Parkeston Quay has been vacated by the Admiralty, but a full Continental service cannot yet be resumed. The new steamer *Felixstowe* is in service, but the others will not be available until later in the year. A third has been ordered, and another has been purchased, and will shortly be ready for use. It is hoped that a daily service to the Continent will be restored in the spring.

At the South Eastern and London, Chatham and Dover Railway meetings, Mr. Bonsor, Chairman of the Managing Committee, dealt at considerable length with the relations between railway companies and the Government, association with the Ministry of Transport, and the work the Railway Companies' Association is doing in the interests of shareholders. In regard to proposals to remove Charing Cross station and bridge, Mr. Bonsor said that he could not

Digitized by Google

imagine that even the London County Council would suggest asking the ratepayers of the metropolis to find 30 or 40 millions for the purpose of doing what a great number of artistic gentlemen thought would be a great improvement. Charing Cross station was not only an asset to the South Eastern & Chatham Railway, but a great asset to a large number of people who used it for the purposes of business. Largely owing to an exceptional sum of £53,759 received in settlement of certain pre-war outstanding accounts, the increased net income has enabled both companies to declare improved dividends.

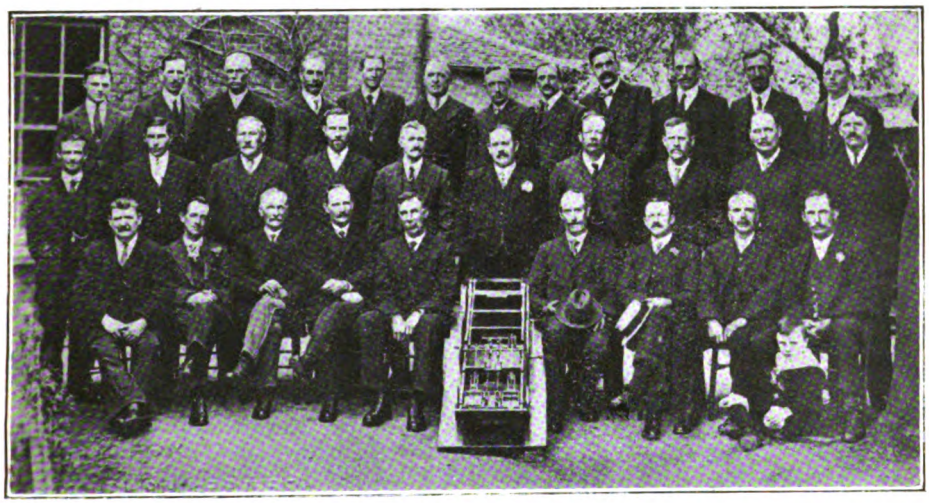
Presiding at the Brighton meeting, Lord Bessborough mentioned that whereas in 1913 80,000,000 passengers passed over the railway, the number for 1919 was 106,000,000, an increase of 30 per cent., notwithstanding a reduction in train mileage of 27 per cent. But at the "rush" hours it is not feasible, in existing circumstances, to squeeze in another train between London and Croydon, and the only hope is in the completion of the electrification programme which has necessarily been held up during the war period.

The value of electrification was also mentioned by Mr. E. B. Fielden, presiding at the Lancashire and Yorkshire Railway meeting: "We are satisfied with the results of the electrification of our line, both in the Liverpool district and between Manchester and Bury, and are of opinion that the time has now arrived when the electrification should be extended to a further portion of the line, which we contemplate should be between Manchester and Oldham, and on to Shaw and Royton."

On the Metropolitan Railway, compared with 1913, the number of passengers actually booked at their stations, apart altogether from those coming on the line from other railways, has increased by practically 28,000,000, or 43 per cent., while season tickets have increased by 57 per cent. Orders have been placed for a considerable amount of additional rolling-stock, both for steam and electrical working.

Engine Drivers at School.

THE group here illustrated represents the Midland Railway Locomotive Mutual Improvement Class, Gloucester, with a sectional model of a locomotive engine.

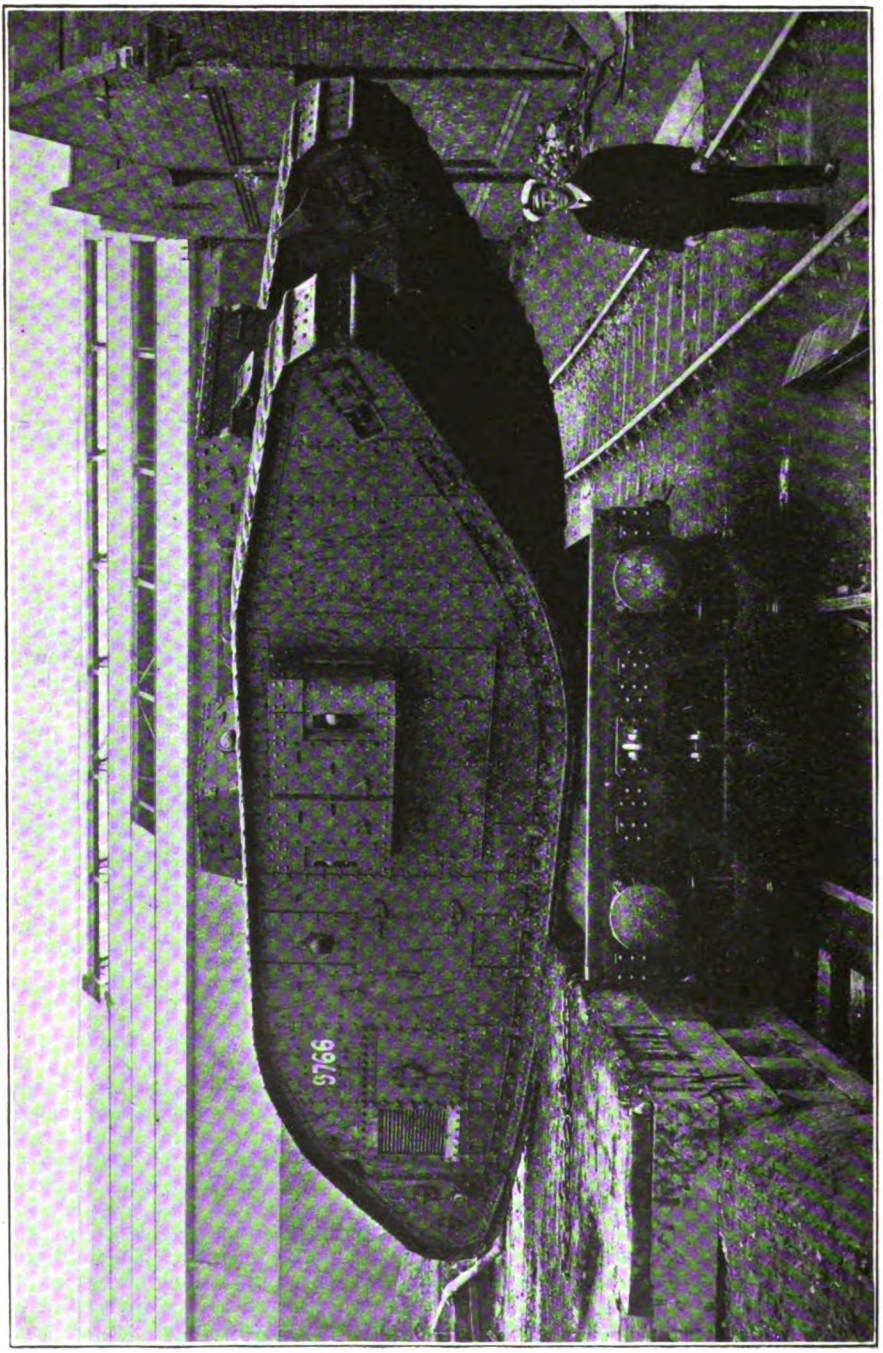


MIDLAND RAILWAY LOCOMOTIVE MUTUAL IMPROVEMENT CLASS, GLOUCESTER.

Inspector W. Tolley, Lecturer, is standing behind an instructional model used for demonstration.

This class is one of many held by drivers, firemen and cleaners all over the Midland Railway system. The men meet together on stated Sundays, and the subjects dealt with are of such as will tend to make clear the intricate problems involved in the study of a locomotive and the best methods of dealing therewith, also the manipulation of the combined steam and vacuum brakes and engine running generally. These meetings are proving of great value to the members, who gain a theoretical knowledge in a very interesting way with the aid of various models which the different classes have at their disposal. The centre figure in the second row, standing behind the sectional model, is Inspector William Tolley, the lecturer

Digitized by Google



A "TANK" SWINGING INTO POSITION UPON A SPECIAL TROLLEY UNDER ITS OWN POWER.

The stability of the trolley, combined with the manœuvring capabilities of the tank, enable the latter to pass from the loading bank to the trolley and take up the desired position quickly and safely.

Digitized by Google

Lancashire & Yorkshire Railway Steamers and War Service.

PRIOR to the war the combined East and West Coast fleets comprised 28 cargo and passenger vessels, with five others owned jointly with the London and North Western Railway. Sailings between Goole and the Continent were suspended July 29, 1914, four vessels being then at Hamburg and one at Copenhagen. Two of the former were able, with much difficulty, to leave Hamburg, but the other two were detained and their crews interned in German camps. Of these, one was handed back to England in December, 1918, the other having been lost while in use by the enemy. The vessel at Copenhagen eventually returned in convoy with other merchantmen.

Of the 24 boats over which the Government assumed control and which were used for a variety of purposes, two were put on cable work. One was first used as an armed boarding ship in the North Sea; later on she acted as a convoy leader for the Norwegian and East Coast convoys. After the signing of the armistice she was employed on bringing troops back from France to Southampton, whilst a sister ship brought British troops from Rotterdam to Harwich and conveyed repatriated German civilian prisoners from Harwich to Holland. Still another boat was sent to the Dardanelles, and there had an eventful experience. She worked in connection with the Gallipoli Expeditionary Force; came under fire of the Turkish batteries, though suffered no casualty; was concerned in the evacuation of Suvla Bay; rendered salvage services to a wrecked steamer which had a valuable cargo of mules, and concluded six months' activities in Eastern waters by the more prosaic but still useful duty of bringing to England a cargo of currants from Greece. When not employed on Admiralty work, the West Coast steamers kept up a regular service between Liverpool and Drogheda. They also assisted on the Fleetwood and Belfast and Holyhead and Greenore services, while the Lancashire and Yorkshire Railway further loaned two boats temporarily to the Great Western Railway for their Channel Islands and Irish services. During the period of control, and down to the end of 1918, four of the steamers were lost at sea whilst working for the Government, three being torpedoed and one mined. In connection with these disasters 20 lives were lost, the remainder of the crews being saved after suffering great privations. The company were responsible throughout for the management of the ships, including the provisioning of the crews, payment of wages and repair and upkeep of vessels. A considerable number of awards were received by officers of these vessels for special services rendered.

How the "Tanks" were Transported.

FOR conveying "Tanks," particularly of the 35-ton classes, by rail 200 specially designed trolleys were adapted or built by various railway companies and used exclusively for this purpose. Each trolley was 37 ft. 2 in. long over buffers, with a tare of 15½ tons, the platform being only 3 ft. 6½ in. above rail level so as to reduce projections of the load beyond the usual loading gauges to the smallest practicable dimensions to permit of transit over required routes. In loading or unloading the "Tanks" were usually worked over the sides of the trolleys, and then turned to a central position, under their own power; but when they had to be passed over the ends of the vehicles screw jacks had to be employed to support the ends of the platforms and relieve the bogies of the considerable strain they would otherwise have had to sustain. Having been securely scotched, chained and sheeted, the "Tanks" were not again disturbed until arrival in France, the vehicles with their loads passing intact over the Channel on the ferry boats via Richborough or Southampton, and thence on to the French railways. A view is reproduced showing a "Tank" passing on to a trolley and turning into position under its own power. The "Tank" traffic is now generally disappearing, but there remains a very useful future for these vehicles, particularly in the conveyance of girders and long timber. To fit them for such traffic they will be equipped with detachable bolsters and stanchions.

War Traffic on the London and North Western Railway.

IN previous issues we have reviewed in detail the record of traffic and services rendered by most of the leading railways; but while we have dealt with various phases in so far as the London and North Western Railway is concerned, we have not hitherto considered its record as a whole. For completeness, therefore, and in view of the many features of special interest, the following condensed record will be in order. It will, of course, be understood that diversion of seaborne traffic to rail, special munition traffic, coal for the fleet to Scottish naval bases, and all the special features characteristic of the period applied equally to this line, in many instances to an accentuated degree, so that these aspects will be fully appreciated without direct reference.

From the opening of the war to the end of June, 1919, special trains for the conveyance of troops, horses, guns, &c., by passenger train services numbered 38,470,

Digitized by Google

conveying 14,967,000 officers and men, 500,000 horses, 5,476 guns, 72,868 military transport vehicles, 45,517 cycles, and 89,745 tons of baggage. In addition 18,000 other specials were run for leave traffic, conveying approximately, 7,300,000 officers and men. Units of troops travelling officially in ordinary trains accounted for another 2,864,000. Of special ambulance trains and trains with refugees or prisoners of war, the number was 13,318. American troop traffic was served by 1,684 special trains, conveying 864,759 officers and men. In connection with demobilisation the London and North Western ran, down to the first week of July, 1919, a total of 2,376 special trains, conveying 709,437 officers and men. Demobilisation camps were set up all over the country. To the Prees Heath military camp, near Whitchurch, the company ran, over a single line, from January 3, 1919, to the date mentioned, 1,587 special trains, conveying 343,458 officers and men, together with 51 guns and 680 transport vehicles.

Beginning February 15, 1917, between Euston and Thurso every week-day, in each direction, a special train was run for the exclusive use of naval officers and men. It continued until April 30, 1919, and the mileage over the London and North Western system alone during that period was 388,700 miles.

Goods Traffic Statistics.

During the war period 17,841 special goods trains were run conveying Government stores, horses, &c. Admiralty coal involved the running of 16,000 special trains, loaded or empty, and upwards of 10,000 out-of-gauge or other exceptional loads requiring special vehicles and special conditions of transit were conveyed. The number of "tanks" carried by the company between April, 1917, and the end of May, 1919, was 3,288. The weight per "tank" generally ranged from about 26 to 35 tons. From Spon Lane, situate on the North Western system between Birmingham and Wolverhampton, there were forwarded 2,202 "tanks" of the large type, special train working and other arrangements being necessary in each instance. The "tanks" were sent chiefly to southern ports, but a large number went to "tankodromes" at Wool (Dorset), and Newbury (Berks), and a smaller number to Cricklewood, N.W. Of big guns, 385, ranging in weight from 50 tons to 189 tons each, and including 129 100-ton guns, were conveyed by the company on special "gun sets," which were constantly in use, not only on the company's own lines, but on lines all over the country. Many other guns, of lesser weight than 50 tons, were also carried. Among other exceptional traffics of national importance conveyed by the company were: 149 large cases of aeroplanes, 122 ships' boats, 95 large ships' propellers, 83 armour plates, 78 heavy locomotives for the French Government, and 62 heavy gun trollies.

Special Services Rendered.

For the repair of railway bridges in Northern France girders were supplied from stock in several instances, involving girders of 46–65 ft. in length. Rolling-stock sent overseas comprised 111 locomotives (96 to France and 15 to Egypt), 6,370 wagons, 209 ambulance train vehicles, permanent way material and cranes (breakdown and workshop).

Alike at Wolverton and at Crewe, the London and North Western Railway undertook the production of a great variety of munitions of war. At Wolverton the items included close on 2,000,000 small parts of fuzes; nearly half a million gaines; over a quarter of a million adapters; the repairing of 676,000 18 pdr. cartridge cases; the building of 94, and the conversion of 274, ambulance vehicles, and the supply of a headquarters mobile train (17 coaches), 1,350 general service wagons, 2,550 ambulance stretchers, and 400 20-ton goods wagons (new). The work done at Crewe comprised an immense output of ammunition, a wide range of guns, gun carriages and equipment, transport material and miscellaneous items, included in the last-mentioned, being all the work in connection with two armoured trains and pressings and stampings for aeroplanes. Work was also undertaken for the Admiralty, for other railway companies, and for a number of private firms engaged on Government contracts.

The Government took over the four express passenger steamers, *Scotia*, *Cambria*, *Anglia* and *Hibernia* (renamed *Tara* by the Admiralty), and three of the cargo steamers *South Stack*, *Snowdon* and *Slieve Bawn*. The cargo steamers were returned to the company after they had been employed for a short period as troop transports. The express passenger steamers were first fitted up and commissioned as Fleet auxiliaries. After about 12 months' service the *Anglia* and the *Cambria* were converted into hospital ships. In May, 1917, the *Scotia* was paid off from the naval service and returned to the company, but was again requisitioned the following December as a troop transport. The *Cambria* was reconverted into a troop transport in January, 1919, but was released a few months later. Of the vessels thus taken over by the Government the *Anglia* was mined in the English Channel in November, 1915; the *Hibernia* (*Tara*) was sunk by enemy submarine in the

Digitized by Google

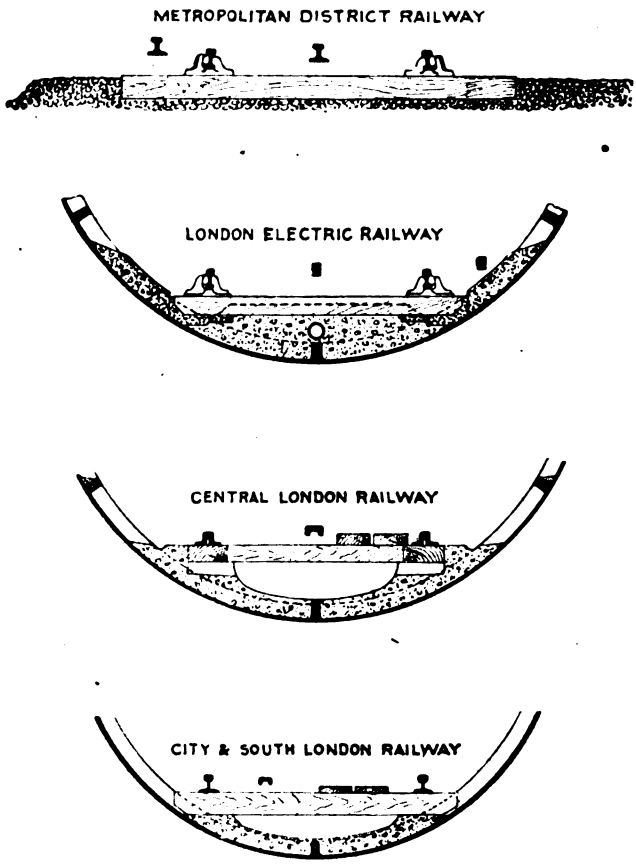
Mediterranean in November, 1915, and the *Slieve Bawn* was sunk through collision with an American destroyer during the night of March 30, 1918.

The number of men on the North Western system who joined the Colours was 31,742, or 34 per cent of the total staff. The number of those who were killed or who died on active service was 3,702. On the outbreak of war the number of women and girls in the employ of the company was 2,123. The maximum number at any time during the war period was 9,154—an increase of 7,031. Except for 447, the whole of this additional 7,000 were taken on as substitutes for male staff.

Underground Permanent Way.

In the course of a paper read before the Permanent Way Institution, Mr. A. R. Cooper, M.Inst.C.E., Engineer to the "Underground" group of railways, gave particulars of engineering maintenance on the lines under his charge. Four distinct types of permanent way are involved, that used on the Metropolitan District Railway being virtually the usual British standard, while the three associated tube lines have their own special constructions as shown in the diagram reproduced. The London Electric track is an adaptation of the standard type of construction for use on a rigid track line. The sleeper is only supported in the centre for a width of about 3 ft. 6 in., the ends of the sleeper forming cantilevers; this provides the necessary element of "spring" to overcome the hard running which would otherwise result, and serves the same purpose as rubber tyres on a road vehicle. On the District Railway rails require changing on 10-chain curves about every nine months, whereas on the 5-chain curves of the London Electric Railway no rails have yet had to be changed in 11 years running. There is only a loss of about 5 per cent. in weight on the rail section of these curves to-day. As another comparison, the 100 lb. bridge rail on the 5-chain curves of the Central London Railway at the Post Office used to be changed every nine months. The standard London Electric Railway track was put in on these curves about five years ago and up to the present time the results have been as good as those obtained on the London Electric curves.

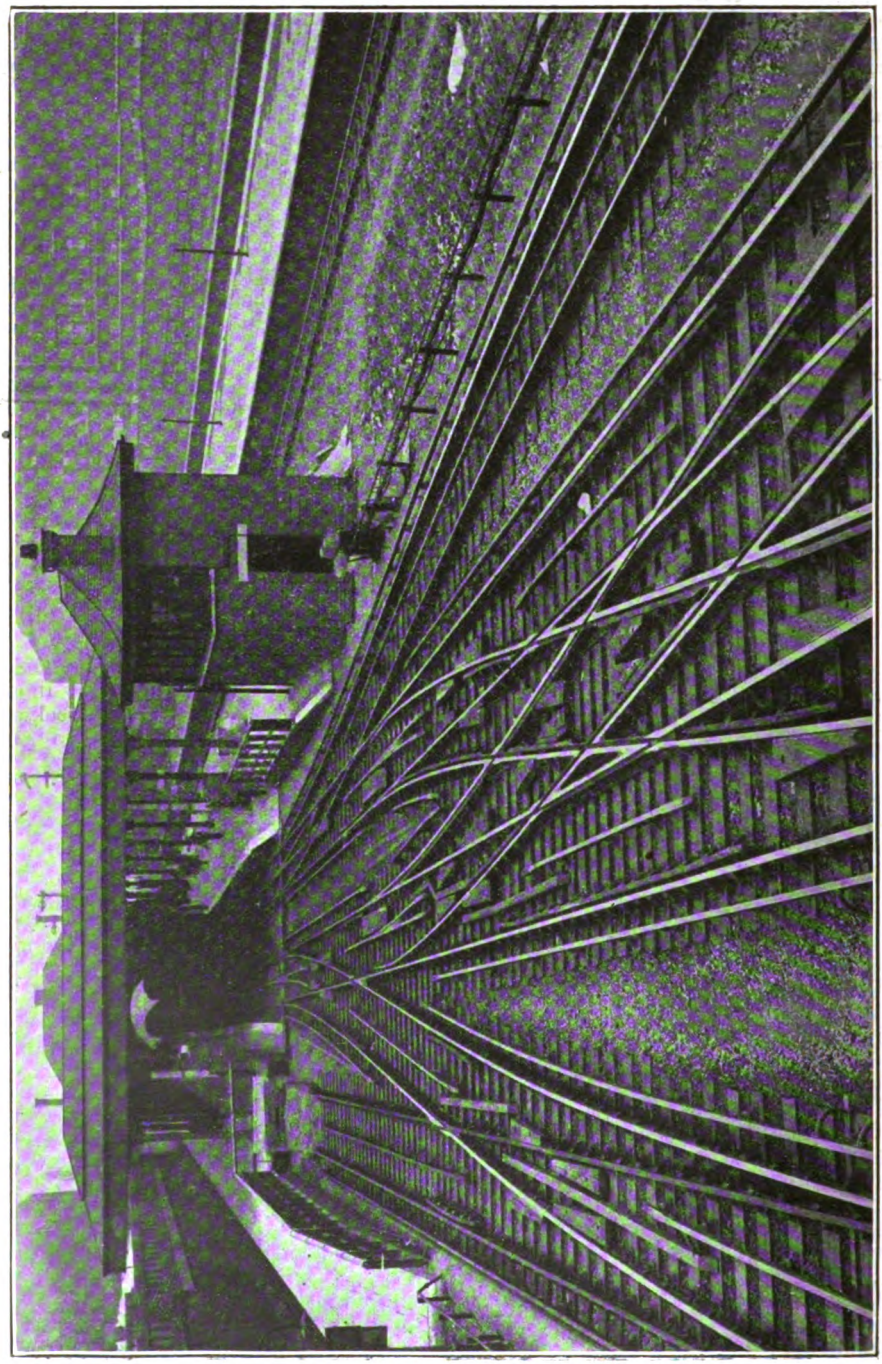
At first sight it appeared that these excellent results were entirely brought about by this particular form of track. As an experiment, this type of track was installed in the two tunnels of the flying junction, constructed on the District Railway at Earl's Court in 1914, the curves being 10 chains and 8 chains respectively. The results were not, however, as good as on the London Electric Railway.



TYPES OF PERMANENT WAY ON THE UNDERGROUND RAILWAYS.

One effect of electric traction on permanent way is to cause uneven wear on the rail surface. This occurs mainly on curves, and the hollows take place at from 2 ft. to 5 ft. centres, in some cases reaching $\frac{1}{16}$ in. in depth in a period of four or five months. This uneven surface causes bad running,

Digitized by Google



JUNCTION LAY-OUT AT QUEEN'S PARK, SHOWING WOODEN RAMPS FOR PREVENTING NEGATIVE OR CENTRE SHOES FROM TOUCHING THE TRACK RAILS.

Digitized by Google

and it is necessary, therefore, to change the rails even with a reduction in section of a few per cent. On the District Railway the practice is to take out rails as soon as hollows develop to a depth of about $\frac{1}{16}$ in. to $\frac{1}{8}$ in., and if these hollows do not show a reduction of section above a certain amount the surface is restored on a planing machine and the rail put back in the road; it is found that these rails have a second life as long as the first one when dealt with in this way.

Special Track Work on Electric Railways.

ELECTRIC traction is very severe on crossings and angles, and in consequence their maintenance has received particular attention. The introduction of manganese steel has been of great advantage; crossings and angles of this material have in all cases been used on the Tube Railways since about 1904, and on the District Railway at busy places. The form adopted for the Underground Railways is a casting, though some companies have in recent years made use of rolled manganese rails for building up special track work. Castings are found to be quite suitable for the class of traffic on the Underground Railways, though for higher speeds and heavier axle loads there is much to be said in favour of the built-up construction. In the short leads which are in use at junctions on the Tube Railways the castings are arranged to connect up to each other, *i.e.*, special attention is given to limiting the number of closures. The junction at Queen's Park, illustrated on the opposite page, can be taken as a standard type. Attention may be directed to the wooden ramps fitted at the track rails so as to prevent the negative or centre shoes touching or catching on the track rails. Manganese steel is a bad conductor of electricity, and where the track rails are used for the return current it is necessary to bond it across.

Breakdowns and General Maintenance.

ON the Underground Railways special attention has been given to the question of dealing as promptly as possible with breakdowns or defects which may interfere with the train service. This matter is of special importance where a train service of $1\frac{1}{2}$ min. headway is run during the busy times. Men are stationed at certain points throughout the road who are always available to attend to any defect that may occur. The importance of the type of failure determines the distance apart of these points of call—or call-depôts. It is customary to arrange as far as possible for the depôts of the various departments—permanent way, signals and electrical equipment of track—to be stationed at the same points, so that assistance may be given by one department to another. These men carry out inspection and overhaul work, but are always in close touch with the signal cabin to which any messages for them are sent. The signalman is provided with a hooter, which he uses to call these men if required.

On the Tube Railways very little, if any, inspection and overhaul work can be carried out during traffic hours, and in consequence the depôts are laid out for carrying out work more in the nature of shop repairs. On these lines track maintenance has to be carried out during the night and when trains are not running. The time is very restricted—about four hours only—and to make up the shift the men are engaged on cleaning and maintenance work about the station premises. The work includes attention to track drains, whitewashing, tile cleaning, &c., and is covered by a schedule.

War Traffic on the Highland Railway.

WITH the outbreak of war, the Highland Railway at once assumed a position of great strategical importance on the lines of communication to the far north of Scotland, the headquarters of the Grand Fleet. The flow of traffic to and from Thurso, the nearest point on land from which Scapa Flow could be reached, was in itself incessant. One of the most interesting developments in this connection was the running every week-day, from February 15, 1917, to April 30, 1919, inclusive, of a Naval special between Euston and Thurso in the interests of the Fleet, a total of close on half a million of exclusively naval passengers being carried during this period. Between Perth and Thurso the train ran, of course, exclusively over the Highland system. On one occasion the naval special was snowed up at Altnabreac, the passengers, after spending a night in the carriages, leaving them next morning and completing the remainder of their journey to Thurso—about 8 miles—on foot. Another stream of traffic went no further than Invergordon, on the shores of Cromarty Firth, where a large dockyard for the repair of warships was created—a development in State policy which at one time led to the main line of the Highland Railway becoming seriously congested to and from the south. Various encampments set up in and around Invergordon led to a great amount of troop traffic at wayside stations which had previously done a very small passenger business, while the establishment in Scotland of mine depôts in connection with the North Sea barrage brought additional volumes of traffic to the Highland Railway. Between August 4, 1914, and August 4, 1919, Invergordon station dealt with 1,020 troop and naval specials, or an average of 17 per month,

Digitized by Google

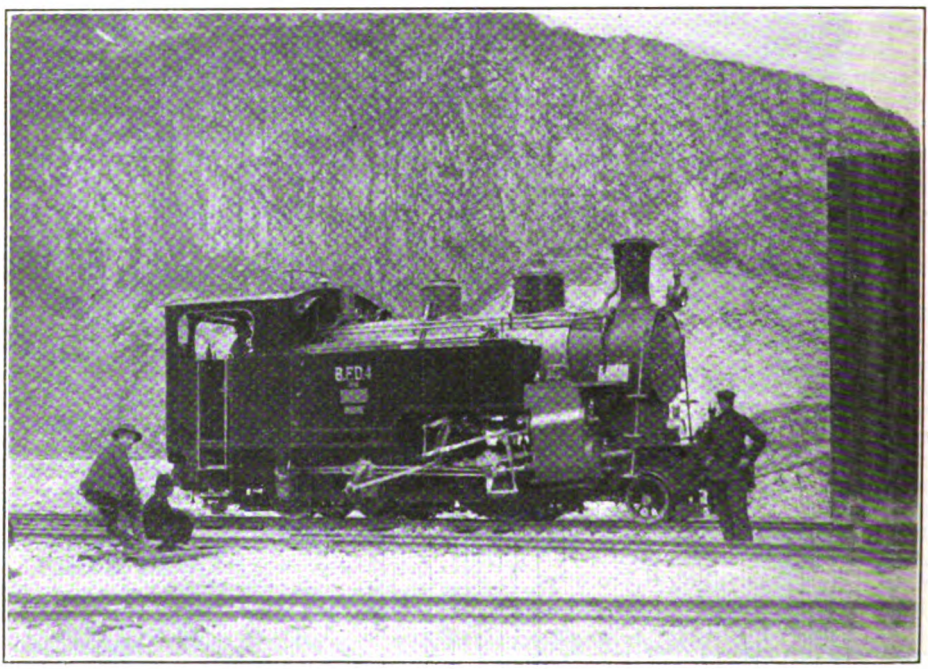
exclusive of naval ambulance trains. The specials averaged about 13 vehicles each, and generally carried from 300 to 400 men. In regard to goods traffic proper, the average number of loaded wagons received at Invergordon daily during the first three years of war—including those required to carry the great amount of material required for building a model village for the accommodation of the dockyard workers—was 72. The number of wagons which passed from the goods yard to the dockyard during the same period was 19,900.

Timber, Coal and other Traffics.

PRACTICALLY all over the Highland Railway timber traffic was abnormally heavy, large quantities being sent to the north for the defence works at Scapa Flow and elsewhere; while a great deal of timber for pitwood and other purposes was sent to the south. Forest areas in the district served are of great extent, and, with the help of contingents from overseas, timber camps were set up in almost every part of that district, and were soon pouring prodigious quantities of timber on to the Highland line. Taking the year 1918 alone, the quantity of pitwood handled during the 12 months was no less than 293,561 tons, while, adding other classes of timber carried on the Highland system, the total for the same year was 403,560 tons.

In 1913 the total quantity of fish carried amounted to 9,244 tons. In the last three months of 1918 the weight of herrings despatched from one station alone—Inverness—was 4,000 tons.

In pre-war days coal for drifters engaged in the sea fisheries was taken to the north of Scotland by coasting vessels; but when, under war-time conditions, this became no longer practicable, the traffic was diverted to the railway, and there were occasions when nearly all stations between Inverness and Wick were blocked with coal wagons which could not be moved owing to the prevailing congestion. At Inverness the total amount of traffic handled for the Admiralty by the Highland Company between August, 1914, and June, 1919, was 123,683 tons.



2-6-0 TANK ENGINE AT ANDERMATT: BRIGUE—FURKA—DISENTIS RAILWAY.

Compared with 1913 the number of passengers carried by the Highland Railway increased in 1918 from 2,222,703 to 3,344,480, and the goods and like tonnage from 653,589 to 1,343,437. Left to its own resources, the Highland Company could not possibly have dealt with such an increase in traffic, and the Railway Executive Committee had therefore to arrange from time to time for loans of engines and rolling-stock, other Scottish and English railways supplying some 20 additional locomotives and a total of, altogether, 1,300 wagons. Even with this welcome help, it was only with extreme

Digitized by Google

difficulty that the Highland, having regard to the limitations of its resources, the situation of its lines and the exceptional difficulties in various respects by which it was faced, was able to accomplish the task which the force of circumstances, and more especially the developments in naval policy, had required it to undertake.

A Station and Locomotive without a Railway.

DERELICT railways without rolling-stock are not uncommon, but a locomotive and station without the necessary railway in connection therewith seems somewhat unique and, therefore, the following particulars, and the two illustrations reproduced, for which we are indebted to Mr. E. J. Miller, will be of interest.

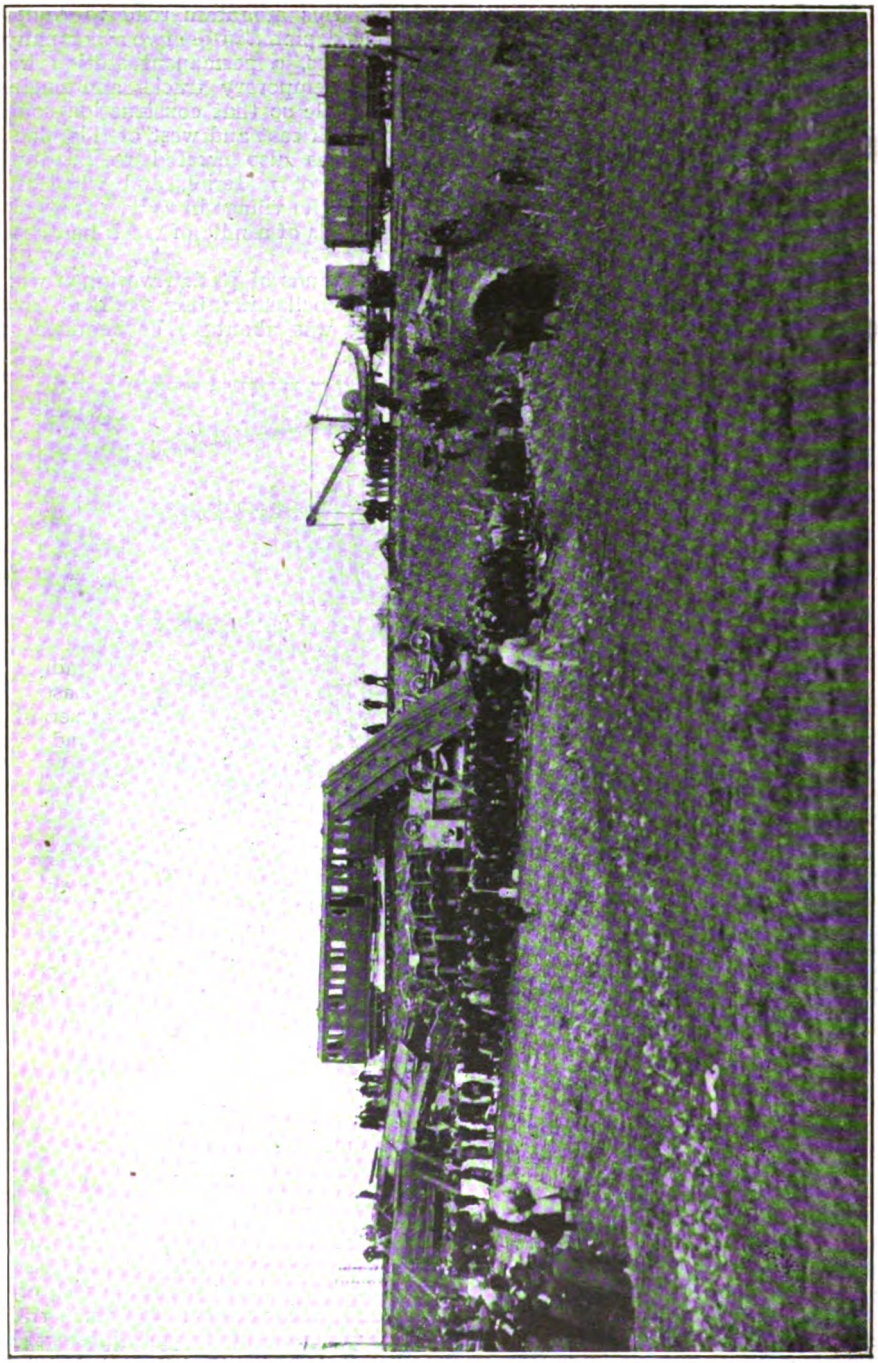
The Brigue-Turka-Disentis Railway, a metre gauge line in Switzerland, is some 62 miles in length, traversing in its course the high plateaus of the central Alps. It was in course of construction when war broke out in August, 1914. To expedite its building, and on account of its peculiar geographical conditions, construction could only be started from its two ends and from the village of Andermatt, the most important place *en route*. To reach Andermatt, which is nearly 5,000 ft. above sea level, the only approach was by mountain road from the station of Goschenen, 1,000 ft. lower, and 2½ miles distant. The necessary material was brought up this mountain road to Andermatt, and as depicted in the two accompanying illustrations, a permanent station was erected and temporary tracks and engine shed were made so that construction could take place both east and west of this place. An engine was also erected to facilitate the transport of material, and when the writer visited the village in July, 1914, only some two-thirds of a mile of track had been laid.

Some thousands of Italian workmen were employed in ballasting the road-bed, and track laying was about to be commenced on the section leading to Disentis; but the western section to Furka and Brigue was not so far advanced. Immediately upon the declaration of war work was entirely suspended, all the aforesaid workmen returning to their homes, and for some considerable time a curious situation was to be seen of a station and rolling-stock without train service. Subsequently in the interest of economy the engine was dismantled, taken to Brigue, re-erected, and now works on the western section, a portion of which was opened in 1915.

ANDERMATT STATION IN COURSE OF ERECTION: BRIGUE—TURKA—DISENTIS RAILWAY.

Curiously enough this station, erected by

Digitized by Google



RAILWAY ACCIDENT AT VIGERSLEV, DANISH STATE RAILWAY.
General View of the Scene at Vigerslev, showing the result of the Collision, and the Break-down Crane in attendance.

Digitized by Google

and for the use of this light railway is now a station for the part-rack and part-adhesion local railway, which, during the war, was opened to Andermatt from the station at Goschenen.

The Midland Railway and the Neath and Brecon.

ARISING out of reference in Mr. Ahrons' articles to the dispute between the Midland and the Neath and Brecon Railways, "West Kensington" writes as follows :—

"I would much like to know if there has ever been in the history of the Neath and Brecon any proposal from the Midland for acquiring the line entirely, forming as it does, such an integral part of the Midland Railway's Hereford, Brecon, and Swansea service. The impossibility of the smaller railway working its own passenger service is well illustrated by the very antiquated stock on its Colbren Junction to Neath branch. The only train I am acquainted with contained a few coaches of apparently early London and South Western origin. Some similarly obsolete coaching was to be met with years ago on the Golden Valley Hay Pontrilas line previous to its acquisition by the Great Western Railway, consisting of some old North London and South Western stock. The two outfits were strangely similar. I would point out one peculiarity of the little Neath and Brecon Railway. Whilst the Brecon-Ynisygenion Junction section is distinctly Midland Railway in working the Colbren-Neath section, especially at its southern extremity, has a Great Western aspect."

Railway Accident at Vigerslev, Danish State Railway.

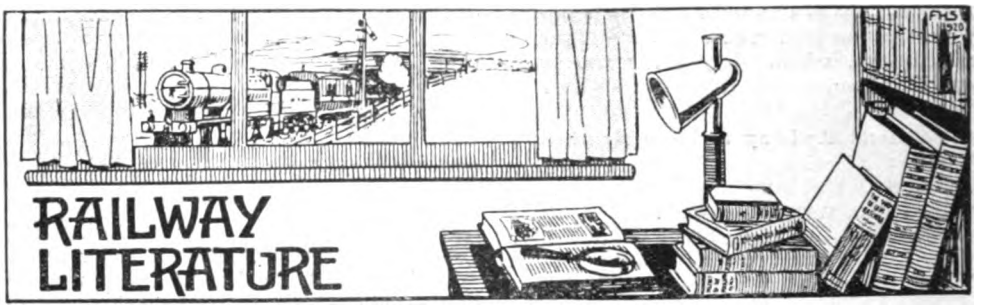
ON November 1 last a serious accident, involving 40 deaths, occurred at Vigerslev, near Copenhagen, on the main line from Roskilde, owing to a peculiar combination of circumstances. A view of the scene after the accident is reproduced on the opposite page. At Vigerslev the goods lines from Copenhagen join the main line to Roskilde, the signalling being electric block with rail contacts controlling essential signals. A train from Copenhagen made an emergency stop, a boy having fallen out, and was then backed about 400 yds. to pick up the child, but was not protected by detonators or handlamps. A special train from Copenhagen, travelling on the goods lines, approached conveying a fire brigade and appliances going to a fire in the direction of Roskilde. In view of the importance of the latter train the signalman reversed the signals for the ordinary train to enable the special to cross on to the main line, and this involved disconnecting the electric block connection, as the interlocking would not otherwise permit of this movement being made. Replacement of the signal mentioned to danger released the block at the next box west, just as an express was approaching; and although the mistake was almost immediately discovered the train had already passed into the section. Meanwhile the fire special had stopped on the main line alongside the standing passenger train, its headlights confusing such view of the tail lamps of the latter as the driver of the approaching express would have, with the result that the express dashed at full speed into the passenger train. Five bogie coaches were thrown down the embankment with the large 4-4-2 express engine through the middle of one and on top of the debris of two others.

Locomotive Performance on Secondary Trains.

THE question was recently raised by a correspondent as to whether locomotive performance on semi-fast and secondary trains can correctly be rated on the same level as that of locomotive work on heavy, fast, long-distance express trains. No conclusive answer can be given to this, for it all depends upon the trains concerned. Many secondary trains are of a light character easily timed, but even these may call for a high standard of work, especially if gradients are adverse (as is frequently the case on branch lines) or traffic hindrances serious, while the mere fact that small and old engines are used adds merit to performances which would otherwise hardly call for remark.

But many semi-fast trains, especially those on main lines and important branches, are heavy, and even moderately smart section times call for hard locomotive work. Such trains frequently include a number of miscellaneous vehicles—horse-boxes, milk vans, &c.—and which may involve attaching and detaching at principal stations, transfer of passengers and luggage is by no means small, and station work often entails excess time which, in the interests of punctuality, requires to be made up on the following running stage. On many lines it is now quite usual to find first-class express locomotives taking such trains, and advisedly so, though this may occur in consequence of the frequent combination of express and slow or semi-fast turns in compiling the duty lists for even first-link engines. In fact, there are so many of these hard semi-fast or secondary services, that, in some instances at least, there can be no question that the locomotive work is as hard as that entailed in working a heavy, fast express, and, therefore, equally justifies the employment of the most powerful engines available.

Digitized by Google



DRUMS AFAR. By J. Murray Gibbon. [John Lane, The Bodley Head.] Price 7s. net. A novel by the author of "Hearts and Faces," best known as the Publicity Agent of the Canadian Pacific Railway, "Drums Afar" is described as an international romance. It deals with the love affairs of an Oxford man and a Chicago girl, but is notable for the pleasing descriptions of University life, the careful and attractive character studies included, and the interest which is aroused throughout, notwithstanding the absence of adventure and the sensational element. The period is immediately antecedent to the great war, now happily concluded. The hero's holiday experiences in Germany, Alsace, France and Belgium during years prior to 1914 are utilised in the working out of the story, and it is then that Charles Fitzmorris first meets Madeline Raymond, who is studying singing. In London, where the hero engages in journalism, he again meets her, and eventually goes to Chicago, where he becomes engaged to her. Conditions in America during the few days prior to the fateful August 4, 1914, are dramatically described, and then comes the testing time for the hero—shall he take advantage of his absence from England, or is it his duty to respond to the call of the Motherland? Eventually he joins some Oxford men, and works his passage to England to enlist, leaving Madeline as he considers his duty; but in the end she also, though American-born, answers the call and comes over to serve as a V.A.D. In the *dénouement* she nurses her one-time fiancé, who comes home severely wounded; but although to a certain extent the outcome is conventional the treatment and setting are distinctly novel. In fact, whether dealing with life at Oxford, touring on the Continent, in the city of Chicago, visiting pleasure haunts in the United States and Canada, or describing conditions in England during the tense earlier years of the war, the author is anything but conventional, and we have read "Drums Afar" with as much interest due to the author's attractive character studies and graphic descriptions, as in regard to the actual construction of the story.

WESTINGHOUSE AUTOMATIC BRAKE: INSTRUCTION BOOK.—A new edition of this useful instruction book has been issued by the Westinghouse Brake Company, Limited. In the introduction it is pointed out that in June, 1914 the aggregate number of Westinghouse brake sets furnished had reached a total of 167,698 for engines, and 3,452,923 for carriages and wagons. The booklet includes a series of drawings and diagrams, together with full particulars of the Westinghouse brake and its operation, giving all information which practical trainmen are likely to require in the course of their duties.

TECHNICAL INSPECTION ASSOCIATION GAZETTE.—Issued by the Technical Inspection Association from the offices at 44, Bedford Row, London, W.C.1. No. 1 of the *Gazette* sets forth particulars of the Association, its objects and operations, and then reproduces reports of the proceedings at the meetings on November 7 and December 5.

MEMORANDUM ON COMBINES AND TRADE ORGANISATIONS.—By J. Hilton. [Harrison & Sons.] Price 1s. net.—Prepared for the Committee on Trusts on behalf of the Garton Foundation, this booklet deals with various types of combinations, the extent, significance, achievements and dangers of combinations, and other aspects of the working and operation of combinations and trusts. Various safeguards and desirable features of control are considered. It may be recommended to the study of all interested in economic and social aspects of trade and industry.

Digitized by Google

Mr. William A. Stanier, who has been appointed Locomotive Works Manager at Swindon, entered the service of the Great Western Railway in June, 1892. Five years later he became a draughtsman, and in 1900 was appointed inspector of purchased material. In the year following he became technical inspector in the running shed at Swindon, and at the beginning of 1903 he was made assistant locomotive superintendent for the Swindon division. Subsequently he was transferred in a similar capacity to the London division, and two years afterwards returned to Swindon as assistant in the management of the locomotive works. A few months later he received the appointment of divisional locomotive and carriage superintendent there. At the beginning of 1913 Mr. Stanier succeeded to the position of assistant manager of the locomotive works.

MR. W. A. STANIER,

Locomotive Works Manager, Swindon, Great Western Railway.

* * *

On the occasion of his retirement from the position of Locomotive Superintendent of the Belfast and County Down Railway Company, Mr. R. G. Miller was recently made the recipient of a handsome presentation from the staff. The movement was participated in by all grades and classes in the service. Mr. Charles A. Moore (General Manager) presided at the ceremony, and mentioned that Mr. Miller had been 60 years in the railway service—20 with the London and North Western Railway Company and 40 with the Belfast and County Down Railway Company. He had been in charge of the building of their new carriages and wagons, and just before he retired he had the satisfaction of fitting the first of their stock to be lighted electrically. He had also made a start with the steam heating, which was now being generally introduced. Testimony to Mr. Miller's ability was borne by Mr. W. F. Minnis, Traffic Superintendent, and representatives of various branches, after which Mr. H. E. Mellor, Secretary, handed over the gifts to Mr. Miller, who suitably replied.

* * *

At the recent quarterly meeting of the Goods' Managers' Conference, held at the Railway Clearing House, a pair of silver candlesticks and a silver inkstand was presented to Mr. George Shaw, who retired from the service of the Great Northern Railway as chief goods manager in September last. The presentation was made by Mr. R. L. Wedgwood, C.B., C.M.G., the chief goods manager of the North Eastern Railway, who expressed the regard felt for Mr. Shaw by his former colleagues.

* * *

Major Eric W. Rostern, M.C., only surviving son of Mr. Joseph Rostern, Chief Goods Manager, Great Central Railway, has been appointed to the position of Railway Adviser on the staff of the Inter-Allied Administrative Commission, which left Lon-

Digitized by Google

don on Tuesday, February 3, for Marienwerder, Eastern Prussia. Major Rostern is the Assistant District Traffic Manager of the Great Central Railway for the Northern Division, and has been loaned to the Foreign Office for this appointment. He was educated at Aldenham, and after matriculation at the London University, he completed his studies at Tours (France) and Dusseldorf (Germany). From May, 1916, he served

MAJOR ERIC W. ROSTERN, M.C.

Appointed Railway Adviser on the staff of the Inter-Allied Administrative Commission.

in France with the Railway Operating Division, R.E., and held in 1917 the position of Liaison Officer to the French Commission de Reseau du Nord. From March, 1918, until his demobilisation in July last he was on the staff of the Inter-Allied Railway Commission, Cologne. Major Rostern was mentioned in despatches, awarded the Military Cross and French Croix de Guerre, and was once wounded. He expects to be away for several months. His brother, Lieutenant J. Norman Rostern, Manchester Regiment, was killed in action at Peronne, in March, 1918.

* * *

At a meeting of the Irish Railway Clearing House Committee, the Right Hon. Sir William J. Goulding, Bart., D.L., was unanimously elected Chairman for the year 1920.

* * *

Mr. T. A. Whittaker, Assistant Locomotive Carriage and Wagon Superintendent, Ceylon Government Railway, since December 1915, has been appointed Chief Mechanical Engineer, Uganda State Railway. Prior to going out to Ceylon in January, 1910, as District Locomotive Superintendent, he was in the service of the Midland Railway Company, which he joined as a pupil in 1897, and when he left in 1909 he was District Locomotive Superintendent at Toton.

* * *

Mr. John Johnson, for 28 years a member of the staff of the Chief Goods Manager's Claims Department, Great Western Railway, has been appointed to a new position, viz., Claims and Salvage Agent. Mr. Johnson commenced his Great Western service at Warrington, where he had general experience in goods station work, and later spent five years in various sections of the office of the district goods manager at Liverpool. He is a past student of the London School of Economics, and was for some years a volun-

MR. J. JOHNSON,

Claims and Salvage Agent, Great Western Railway.

tary instructor of youths in several branches of education. Some few years ago he investigated the goods claim and salvage arrangements of other railways, and revised the Great Western Railway regulations relating to this department of its business. He is a member of several important committees, including the Joint Claims, Claims Prevention, Consignment Notes, Advice Notes, and General Agreements.

Digitized by Google

PRIZES and certificates gained by successful students at the Lancashire and Yorkshire Railway's School of Signalling, were distributed on January 29. Mr. Ashton Davies, M.B.E., Superintendent of the Line, presided, and the distribution was made by Mr. T. W. Royle, M.B.E., Assistant Superintendent of the Line. Mr. J. White, Chief Block Inspector, who has acted as lecturer for ten years at the school, was the recipient of a gold watch, albert and seal, presented as a token of appreciation by past and present students.

* * *

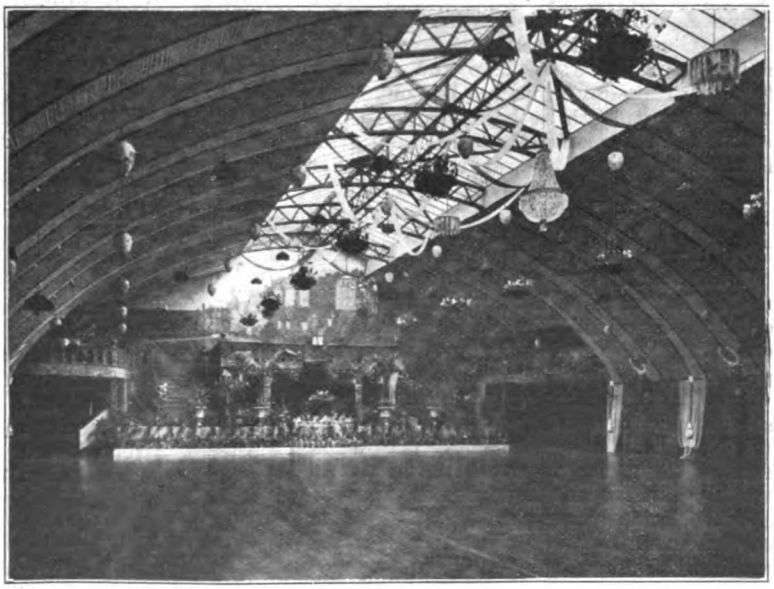
IN order that the many admirers of the Great Eastern Railway Musical Society who are "crowded out" at the Hamilton Hall concerts may have an opportunity of hearing the choir and orchestra perform together, the Queen's Hall, London, has been taken for the final concert, the date being deferred to Saturday, April 17. On this occasion not only will the London choir take part, but also the choirs from Cambridge, Ipswich and Norwich, bringing the number of voices up to some 220, representing, with the addition of the orchestra, a total of 320 executants. All concerned are working hard to make the occasion a real musical event in London, and the performance will doubtless be one of which we of the Great Eastern Railway may be justly proud.

* * *

EFFORTS are being made by the Association of Superannuated Railway Staff, of which Mr. Geo. Bethel Bayley, 19, Elgin Road, Croydon, is the chairman, to get another deputation received at the House of Commons, and one by the Prime Minister. A very large number of members of Parliament have already expressed willingness to support the objects of the Association. RAILWAY MAGAZINE readers generally, will sympathise with the movement to obtain an improvement in the conditions and terms now governing retirement from the railway service, and also the payments made to those who retired before the war. The superannuation allowances are arranged on a pre-war basis, and in consequence of changed circumstances and the serious diminution in the purchasi ng power of money, superannuated railway officers and clerks are badly feeling the pinch.

* * *

FRIDAY night, February 6, witnessed the fiftieth or jubilee ball of the officers and salaried staff of the Midland Railway, the venue being, as usual, at Derby. Probably the most enjoyable event in the Derby year is the Midland Railway ball. It is not so much a terpsichorean diversion as a social reunion of railway people separated by the far-flung Midland system. It unites, for once a year at any rate, officers who otherwise would only be known to each other by business correspondence. On such occasions the unlimited resources of the railway are freely drawn upon in the matter of decoration. The result, therefore, was a general effect that was as tasteful as it was captivating. It is calculated that the guests numbered 960, and at each of the four suppers 240 were accommodated. A service of Trent motor omnibuses ran for the convenience of the out-station visitors between the Midland Station, the Midland Hotel, and the Drill Hall. The cloak room arrangements were perfect. Every precaution was taken against fire by the presence of members of the Midland Railway Fire Brigade.



MIDLAND RAILWAY BALLROOM, FEBRUARY 6, 1920.

Digitized by Google

The President of the Ball was Mr. Frank Tatlow, C.B.E., General Manager of the Midland Railway.

* * *

THE inaugural meeting of the Institute of Transport will be held in the Lecture Theatre of the Institution of Civil Engineers, Great George Street, Westminster, S.W. (by the courtesy of the Council), at 8 p.m. on Monday, March 15, when the Rt. Hon. Sir Eric Geddes, G.C.B., G.B.E., M.P., will deliver his Presidential Address.

* * *

IT is intended to form a library in the Ministry of Transport, which it is hoped to make as representative as possible of all branches of transportation, and their development, as well as of power, trade, industry, agriculture and other subjects which have an important bearing upon, or are affected by, transport. Transport in other countries will be fully represented in the collection, which, it is hoped, in course of time, will greatly facilitate the study of the "science of movement." Apart from text-books and other works of reference, official publications and the like, the Ministry is endeavouring to obtain reports and other publications of local authorities, transport undertakings, chambers of commerce, trade associations, technical societies, committees and other public bodies, and generally that large class of literature which is not published in the ordinary course, but which lends valuable aid to the study of transport and trade development, both in this country and abroad. The library will form part of the intelligence service of the Ministry, which is now in course of organisation under the Director-General of Development, and whose function it will be to keep the Ministry informed of all developments in connection with transport, both at home and in other countries. Any assistance in making this collection as complete and comprehensive as possible will be welcomed.

* * *

FOR the benefit of persons in business in Manchester and who desire to reside in outside districts in healthy surroundings the Lancashire and Yorkshire Railway is distributing an excellently produced and well-illustrated booklet entitled "The Breezy Northern Heights of Manchester." The electrification of the Lancashire and Yorkshire Railway line from Victoria Station, Manchester, to Bury, promises to have a powerful influence on the residential districts in North Manchester served by this system. These districts include Woodlands Road (Cheetham), Higher Crumpsall, Heaton Park, Prestwich, Whitefield and Stand, at an average height of 300 ft. above sea level. The electrification means not only an augmented service but an accelerated speed. Comfort in travelling has been greatly enhanced by the spacious, well-lighted and well-ventilated electric cars. Another equally attractive booklet issued by the same company deals with the ideal residential districts served by electric trains between Liverpool and Southport and Liverpool and Ormskirk. The book includes a diagram of the electrified lines in question. For further information RAILWAY MAGAZINE readers should apply to Mr. Ashton Davies, M.B.E., Superintendent of the Line, Manchester.

* * *

AT the twentieth annual meeting of the members of the Railway Club, 92, Victoria Street, S.W.1, held on Tuesday evening, February 10, a very satisfactory report and financial statement was submitted. Both demonstrated excellent progress, and were generally admitted to be the best in the history of the Club. Mr. W. Parker presided, and the business included several minor alterations in the Club's rules, also the election of officers and committee for the ensuing year. The officers are Mr. E. J. Miller, hon. secretary; Mr. F. M. Gates, assistant hon. secretary; Mr. K. Ffitch, hon. treasurer; Mr. H. W. Bardsley, hon. librarian; and Mr. M. D. Greville, hon. steward. At the conclusion of the business meeting Mr. Bardsley took the chair and Mr. B. M. Bazley presented a paper entitled: "Improvements in British Railway Carriages," which was illustrated by a large number of drawings and photographs. An animated discussion followed, and Mr. Bazley was warmly thanked for his well-considered contribution. At the March monthly general meeting Mr. J. G. Ford-Stevens will deal with the subject, "Goods Train Operation." A number of railway locomotive shed visits and other outings have been arranged for the summer months. RAILWAY MAGAZINE readers wishing to participate should join the Club at once.

* * *

IN a recent issue of the *Railway Gazette* in an article on "The Express Passenger Locomotive of the Future," the author expresses the opinion that the firebox may some day be cut out and oil gas burnt directly in the tubes; also he considers that a turbine-driven locomotive is "well within the limits of possibility."

* * *

ALTHOUGH mechanical lubricators are not necessarily employed for superheater locomotives there is so much to be said in their

Digitized by Google

favour that in British practice very few modern designs are not so fitted, and, as shown by the extent to which it is employed, the Wakefield type can almost be regarded as the British standard. The lubricator can be operated in various ways, from the valve gear, from a return crank on one of the coupling pins, or otherwise as convenient. Thus, South Eastern and Chatham Railway rebuilt 4-4-0 engine No. 179, illustrated by the RAILWAY MAGAZINE frontispiece last month, has the Wakefield lubricator operated from a coupling rod pin, and Caledonian Railway 2-6-0 engine, No. 35, shown on another page in this issue is similarly adapted. The more usual practice is, however to actuate the lubricator feed from a moving part of the valve motion, and as thus employed the Wakefield lubricator is included in the equipment of a large proportion of modern British locomotives.

* * *

BY the courtesy of the North Eastern Railway the RAILWAY MAGAZINE is able to reproduce a photograph of a quaint old engine, the original of which was taken on tin before photography attained its present state of perfection. Few of our readers can claim to have seen an older photograph of a locomotive. It is stated the engine ran between Weatherhall and Waskerley (the highest altitude on the North Eastern Railway), and was apparently one of the old "colliers" of the Stockton and Darlington period, probably it was supplied in 1831. The driver was Mr. W. Graham (at rear of the engine), father of Mr. Wallace Graham, locomotive foreman, Durham, and the fireman, Mr. W. Shaw.

No. 16 "STANHOPE" ENGINE. AN OLD "COLLIER." STOCKTON & DARLINGTON RAILWAY.

* * *

Two Hull readers, Messrs. H. R. Gale and J. B. Glossop, send notes in regard to the work of the North Eastern Railway locomotives which include several features of interest. Among older engines now superheated are the following:—4-4-0, Class "Q," Nos. 1875, 1877, 1904, 1905, 1907, 1925; Class "Q1," No. 1870; 0-6-0, Class "P1," No. 2067; also many engines of Classes "B" (0-6-2), and "C" (0-6-0) Some of these engines now have "Pop" safety valves. No. 1619 (three-cylinder compound 4-4-0) has been stationed at Hull for the past three or four years. Hull and Barnsley Railway 0-8-0's Nos. 117, 118, 119, 120, and 125 have been working North Eastern traffic at Hull for some time. R.O.D. engines in the district include Nos. 1734, 1736, 1960, 1966, 1967, 1972, 1982, 1977, 1987, 1990, 1940, 2082. Single-wheeled engines still work much of the express traffic out of Hull, except to Leeds. In regard to old engines Macdonnell 4-4-0, No. 1496 is at Hull, and Nos. 158 and 281 at York. During the past summer four of the old 1001 class of long-boilered goods engines were at work in the Whitby-Malton-Scarborough districts, Nos. 1263, 1273, 1275 and 1289. Class "Z" 4-4-2 engines now occasionally work into Hull. Goods engines are now painted in the new livery, with large numerals on the tender.

* * *

THE engines involved in the recent collision at Skelton Bridge Junction, three miles north of York, North Eastern Railway, were, by a curious coincidence, Nos. 787 and 788, both of the large-boilered 4-6-0 mixed traffic series, class S2. There was an up-goods train passing from the up main

Digitized by Google

to the up goods line at the junction, and as the engine crossed the down main line it was run into by a down light engine; the result was practically a head-on collision, both engines having their bogies shorn off, and getting badly knocked about at the leading end. No. 788 is the engine fitted with the Weir feed-water heating apparatus and pump.

* * *

ILLUSTRATED on this page is No. 1, the first of two two-ton electric vehicles built for the Metropolitan Railway. The vehicle is of neat appearance and is being used for parcels collection and delivery services from Baker Street Station. It has a speed of approximately 10 miles per hour, and will run for a distance of from 35 to 40 miles on one charge. This is the first experience of this company in the use of electric road vehicles for collection and delivery purposes, and may be looked upon in the nature of an experiment.

* * *

CLOSED for general passenger traffic throughout the war period the Dover-Calais route was again brought into use for public traffic on January 8 last. The down train leaves Victoria at 11 a.m., reaches Dover Marine Station at 12.55 p.m., the arrival at Paris being 20.15 (24-hour system). This train has a restaurant car between Calais and Paris. The return service, with sleeping cars to Calais, leaves Paris (Nord) at 23.05, and the train from Dover is due to leave at 8.30 a.m. next morning, reaching Victoria at 11 a.m.

* * *

THE Channel Tunnel Parliamentary Committee, in a *résumé* of the recent history of the project, states that it is uncertain when the Cabinet will arrive at a decision, but it is clear that the Bill for the construction of the tunnel cannot be passed in the forthcoming session until it has received the whole-hearted support of the Government. Failing that condition the commencement of this, the greatest of the works of reconstruction, must be delayed for another year.

* * *

FROM the Great Western Railway the Bath Corporation has received an intimation that at present it is impossible to comply with the request for the re-opening of Twerton Station.

COMMENCING February 2, the North British Railway took over the working of the Carmyllye Light Railway for the Dundee and Arbroath Joint Committee, and will continue to work traffic until January 31, 1921. The North British Railway provides engines and men to work Dundee and Arbroath joint line goods trains until March 31, after which the Caledonian Railway will take over the working for the ensuing 12 months.

* * *

IN a lecture at Winchester House, E.C., to the Secretaries Association, Mr. F. Porter Fausset, LL.B., barrister-at-law, dealt with some aspects of the London traffic problem, and described the various improvement schemes which were put before the Select Committee on Metropolitan Transport in July last. The public had a right to know, he said, when these promises were going to be fulfilled. The uncertainty of the position and the increased cost of outlay no doubt contributed to the delay. Upon the question of workmen's fares, the lecturer pointed out that the Cheap Trains Act, 1883, was passed for the benefit of the "poorer classes," but the "new poor" could scarcely be expected to pay the deficit on the workmen's ticket as well as the increase on their own. There were special clauses in the Metropolitan Railway Acts fixing low fares for workmen travelling before a certain hour in the morning. This was reasonable when that special class of traffic was not using the trains at the rush hours; but the introduction of the eight-hour day

MOTOR VEHICLE FOR RAILWAY PARCELS COLLECTION AND DELIVERY.

Digitized by Google

had thrown the whole situation into the melting pot, and it was only logical for the Tube Railway Companies in their new Bill to try and do away with workmen's tickets.

* * *

THOUGH the letters C.P.O.S. are not very familiar to the British public they stand for great developments in modern shipping. C.P.O.S. are the initial letters of the Canadian Pacific Ocean Services, Limited, a company formed in 1915 to take over the fleets of the Canadian Pacific Railway and the Allan Line. The company now controls a fine fleet of large fast steamers on its Atlantic route, while its ships on the Pacific are the largest and fastest on that ocean. The C.P.O.S. and its forerunner, the Allan Line, has probably done more to improve the standard of emigrant traffic to Canada than any other company. By building better ships and faster ships, and instituting great reforms in accommodation, the present-day emigrant to Canada is enabled to travel in comfort, a marked contrast to travelling only a very few years ago when the emigrant to the Dominion was treated rather worse than a horse or bullock. Of present-day ships engaged in the Canadian trade, this company's *Empress of France* is undoubtedly the best. She is a magnificent steamer of 18,481 tons, with quadruple screws driven by powerful turbine engines. Her accommodation in every class is superb. Naturally, the first class is the most wonderful, the rooms are decorated in styles reminiscent of the Stuart period, and are faithful replicas of apartments in old English mansions. Her second-class is in every way equal to the first of a few years ago, while her third-class accommodation is a great advance on anything heretofore attempted. The public rooms are spacious, well lighted and aired, and give a degree of comfort undreamed of in older ships. The cabin accommodation is confined to separate cabins with two, four, and six berths, the old style of large, many-berthed cabins is entirely superseded. During the war the *Empress of France* was employed as an armed merchant cruiser, and did very useful work as flagship of the 19th Cruiser Squadron in preventing foreign ships running the blockade. She has now been entirely overhauled and reconditioned, and is again on her run from Liverpool to Canada. At present the C.P.O.S. have four large steamers building to augment their magnificent fleet. When these vessels are completed and take their places in the company's service travellers to Canada and the United States will have the most modern and up-to-date ships at their disposal.

RECENTLY the Premier of Queensland made allusion to the intentions of his Government for State development, in the course of reference to a proposal that the projected railway from Adelaide to the Northern Territory should deviate into Queensland. Mr. Theodore said he had been in touch with the Commonwealth Government in the matter, and it was suggested that if the Commonwealth Government was willing to build a connection between the Katherine and the Queensland border, somewhere in the vicinity of Camooweal or Lake Nash, Queensland could connect up with its own system either from the Dajarra Creek locality or further northward from the proposed Gulf railway, which would go from Cloncurry to Burketown, either connecting that section with the border at Camooweal or Lake Nash, or the more southerly terminus at Malbon, in the Duchess district, where the Queensland Government was now extending the line to Moonah Creek. No definite arrangement has yet been made, but there was not the slightest doubt that there were many advantages in building a Northern Territory railway in Queensland instead of adopting the direct north and south route. A line from the Katherine to the Queensland border, the Premier continued, would traverse the best portions of the Barklay tableland, which extended for several hundred miles into the Northern Territory. It would enable closer settlement to take place over a very extensive area of country. It was the State Government's intention to develop a port in the north for the shipment of products overseas, and that port would greatly benefit the territory served by the Katherine to Queensland railway, and would give shipping facilities to an immensely wealthy region which is at present without any such facilities. He was sure in his own mind that there was a very extensive province to be developed in that part of Australia, both on the Queensland side of the border and on the Northern Territory side.

* * *

A REPORT of the Queensland Public Works Commission on the proposed system to open up the Northern Burnett and Callide Valley lands for closer settlement and connecting the terminus of the proposed line from Mundubbera to the Northern Burnett with New Cannindah, and from a point of this connection at or near Monto with Rannes on the Dawson Valley line, was laid on the table in the Assembly just recently. Dealing with engineering and finance the report states that owing to the increased cost generally the estimates show a considerable

Digitized by Google

advance on the prices submitted by the experts of the Railway Department, when these lines were first submitted to Parliament, and the whole of the scheme will now cost something approximating £2,000,000. The recommendations of the Commission are :—(1) That a line be built from Mundubbera to New Cannindah, 77 miles from Eidsvold and Monto, at a cost of £540,000 ; (2) That a line be built from Many Peaks to New Cannindah, 28 miles, at a cost of £618,000 ; (3) That a connecting line be built from Rannes to Monto via the Prairie country, 110 miles, at a cost of £705,000.

* * *

A REPORT of the Queensland Public Works Commission on proposals for the construction of railways in the Gulf district to connect with the back country, &c., states that after carefully weighing all the evidence of experts and local representatives, and relying on their personal observations, the majority of the Commission decided that the best interests of Australia in general and Queensland in particular, would be served by opening up the undeveloped north-western portion of the State, with railways running northward from Cloncurry and Camooweal, together with the adoption of Burketown as a terminal port for the Gulf of Carpentaria. The Commission therefore, recommends :—

(1) That a Government railway be built from Dobbyn (the northern terminus of a line 80 miles from Cloncurry), to the ballast ground near Burketown, on the Albert River, a distance, approximately, of 206 miles.

(2) That the route recommended by Mr. E. H. Macarthur, officer in charge of surveys, be adopted, namely, from Dobbyn to Mistake Creek ; thence to a point on Myally Creek, about 19 miles from Mount Oxide ; thence to Gregory River at Gregory Downs Station ; thence to Burketown, and finally to the ballast ground on the Albert River, five miles from the coast.

(3) That a railway be built from Camooweall to connect with the Burketown line at a point near Gregory Downs, thus conserving the Territory trade for this State and finding an outlet through a Queensland port.

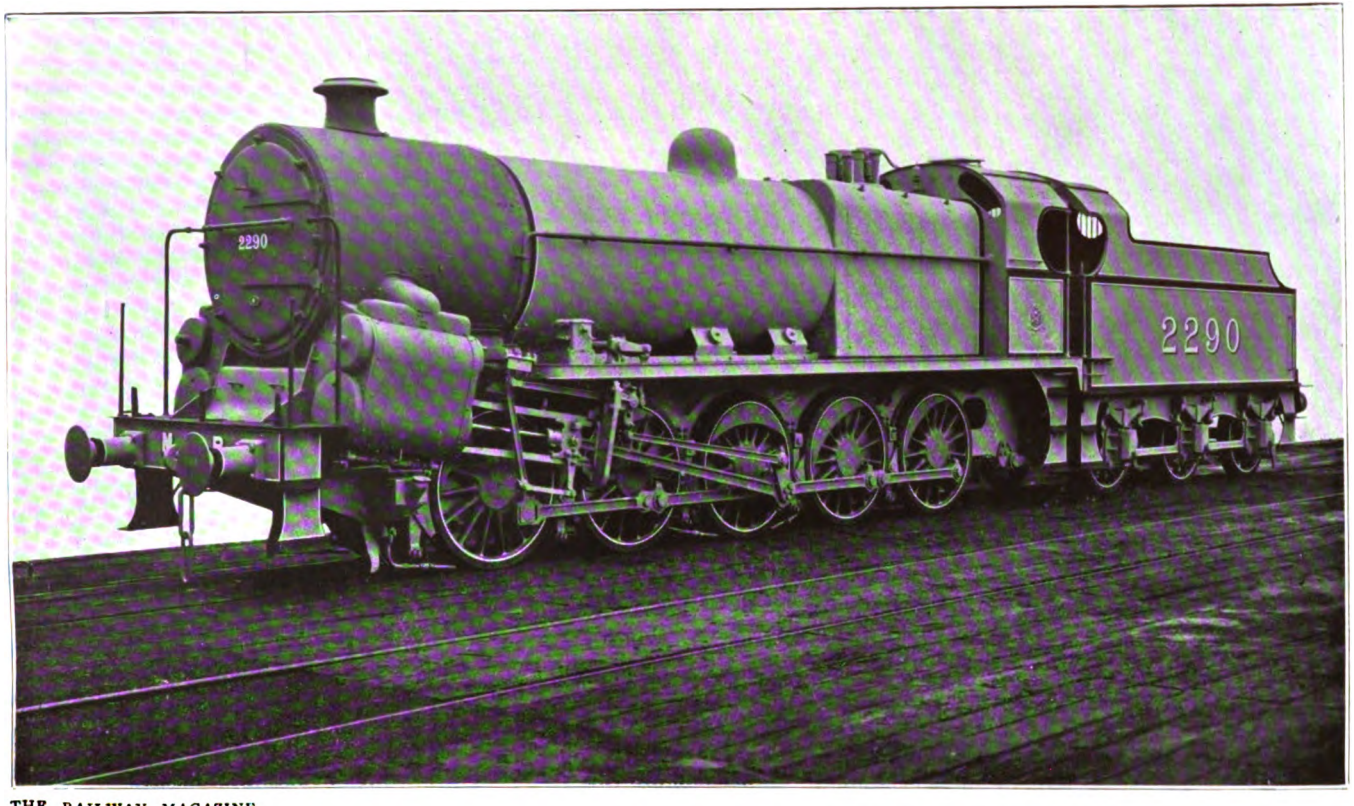
The report reviews the possibilities of the country, and adds that in one or two places the estimated cost of the line is £6,000 per mile ; but it can be built for an average cost of about £4,500 or £4,700 per mile. This report is signed by Messrs. Stopford, Gilday, Collins and H. J. Ryan, MM.L.A.

Photo.] [*W. H. C. Kelland.*

ALSACE-LORRAINE RAILWAYS.
4-6-2 Locomotive on Express Train.

Digitized by Google

Digitized by Google



THE RAILWAY MAGAZINE.

MIDLAND RAILWAY FOUR-CYLINDER 0-10-0 BANKING ENGINE.

SIR HENRY FOWLER, K.B.E., Chief Mechanical Engineer.

Cylinders (4), 16¾ in. by 28 in. Coupled wheels, 4 ft. 7½ in. diam. Wheelbase, 20 ft. 11 in.
Steam Pressure, 180 (designed for 200) lbs. per sq. in. Grate area, 31·5 sq. ft.
Heating Surface: Firebox, 158·25 sq. ft.; Tubes, 1560 sq. ft.; Total, 1718·25 sq. ft.: Superheater, 445 sq. ft.
Total weight in working order: Engine, 73 tons 13 cwt.; Engine and tender, 105 tons 4 cwt.

Digitized by Google

Photo.] [*J. F. Gairns.*

LONDON & NORTH WESTERN RAILWAY ELECTRIC TRAIN AT ADDISON ROAD STATION.

The West London and West London Extension Railways. [No. I.]

W. J. SCOTT, B.A., A.M.S.E., &c.

THE history of this curious line, once best known as "Punch's Railway," falls into two periods, with a blank of nearly twenty years lying between them. The first period dates from some time in 1840 to 1844 inclusive; it began—so far as any records tells us—with atmospheric working, as a single line of rail between Wormwood Scrubs and Shepherd's Bush, *i.e.*, from south of the Great Western main line at the former point to the Oxford high road (locally known as "Uxbridge Road") at the latter. In Haydn's "Dictionary of Dates" [21st Edition], we are told "Experiments were made on a line of rail, laid down across Wormwood Scrubs, London, between Shepherd's Bush and the Great Western railroad, to test the efficiency of atmospheric tubes, the working of the air pump, and speed of carriages upon this new principle on railroads, in June, 1840." But as elsewhere, (*i.e.*, on the Croydon Railway, and afterwards on the South Devon section of the B.G. main line, from Paddington to Plymouth) Brunel's atmospheric system was far from successful. The shipbuilding firm of "Samuda Bros.," who contracted for the work (in South Devon as well as at Wormwood Scrubs), were ardent believers in Brunel's ingenious but unpractical device: we are told that on the West London line they "took away their plant slowly and unwillingly." The atmospheric experiment having come to a (dead) end, the original line was completed, both northwards to the L. & N.W. (then known as

Digitized by Google

the "London and Birmingham") main line, crossing the Great Western track on the level, and also southwards (under the Uxbridge Road at Shepherd's Bush) to the "Kensington Canal" which latter waterway became the property of the West London Company. In "Bradshaw's Railway Companion" for the year 1844, we find a time-table of the West London Railway as between the Kensington terminus and an exchange station on the London and Birmingham line called "West London Junction" (practically the same site as Willesden Junction Station stood on quite twenty years later). In the Great Western tables for that date, no mention is made of any station at "Wormwood Scrubs," but as two wooden platforms were to be seen near West London Junction (now "Old Oak East") signal-box, even in the sixties, it seems certain that a few trains (to be exact, 3 down and 2 up ones) must have called there to exchange passengers; most likely such stops were only conditional ones, and were often not made, since the three down trains by which a connection from the West London line was given were allowed only the customary 11 minutes between Paddington and Ealing, a distance (then) of 5½ miles. As this West London table is but little known we give it here in a somewhat more complete form, the arrival times being estimated to the best of our ability.

This arrangement of seven northbound to only four southbound trains (involving three empty trips into Kensington) was quite worthy of "Punch's Railway." It will be seen that the Great Western main line was only crossed six times in all (by four down and 2 up trains): still for a crossing on the level (!) this was quite

WEST LONDON RAILWAY, 1844.

NORTHBOUND TRAINS.

	a.m.	a.m.	a.m.	a.m.	p.m.	p.m.	p.m.
Kensington dep.	6 55	8 50	10 0	10 45	2 55	5 55	6 20
Wormwood Scrubs (for G.W.R.) arrive about	—	9 0	—	10 55	—	—	6 30
West London Junction (L. and B.R.), arrive about	7 8	—	10 15	--	3 8	6 8	—
By G.W.R. train— Wormwood Scrubs, departure about ..	—	9 5	—	11 5	—	—	6 35
By London and Birmingham train— Departure from Junction Station ..	7 14	—	10 29	—	3 14	6 14	—
For	Birmingham	Maidenhead	Tring & Aylesbury	Maidenhead	Wolverton	Wolverton	Slough

SOUTHBOUND TRAINS.

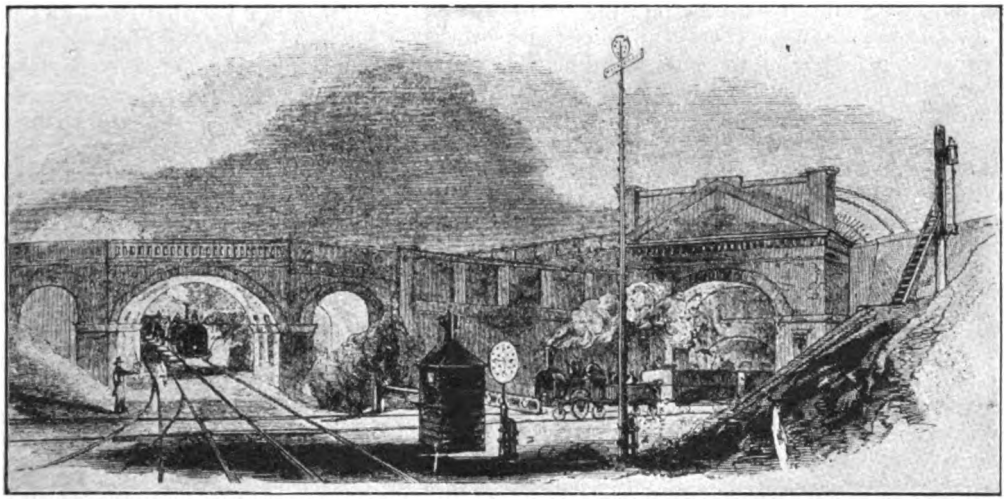
From	Slough.	Wolverton.	Aylesbury and Tring.	Slough.
		a.m.	p.m.	p.m.
West London Junction by London and Birmingham train, arrive	—	9 55	12 5	—
Wormwood Scrubs by G.W.R. train, arrive	9 36	—	—	6 35
West London Junction (L. and B.R.), departure		10 30	12 15	—
Wormwood Scrubs	9 40	—	—	6 40
Kensington (West London Railway), arrive about	9 50	10 43	12 28	6 50
	a.m.	a.m.	p.m.	p.m.

TIMETABLE, WEST LONDON RAILWAY, 1844.

Digitized by Google

enough. The most often quoted gibe in *Punch* on this unlucky line was "it begins nowhere, and doesn't go anywhere": certainly the former seems quite applicable to its Northern extremity, which may be said to be at Willesden Junction, twenty years or more before Willesden Junction was opened. But can a line which ended at Kensington, the famous "Court Suburb" be truly said "not to go anywhere"? Ah! but Kensington, especially in those days, lay round its High Street, nearly a mile eastward of the West London Station; which so far as one can make out stood roughly where Warwick Road (Kensington) coal depôt now is. That is at a point south of the present Addison Road Station, though not far beyond the southern end of the latter's platforms. Anyhow, though the line lay wholly, or almost wholly, within the bounds of the then Metropolitan area, it always was—indeed, to-day it still is—too much on the edge of London's population or even outside of it to be of any great worth as a passenger line. So it is without surprise we note that in the 1845 tables its place can nowhere be found: the "West London Junction" exchange platform—with its 4 down and 2 up stops—had vanished from the London and Birmingham time-table, and trains, (whether atmospheric or steam-hauled) had ceased to run across Wormwood Scrubs. For a while a small revenue, said to be £7,000 a year, came in from the Kensington Canal, *i.e.*, from barge traffic between the Thames at Chelsea and the Canal-end at Kensington; but the railway itself lay derelict until its revival, with a southern extension, in 1863.

As we learn from law-suits in the early Fifties, the hapless little line hired itself to the great system now known as the London and North Western in or about the year 1845; but the leasing company seem to have thought the best thing they could do for the leased line was to run no trains at all! Despite protests from Kensington tradesmen, and actions brought by the West London shareholders in '53 (which actions resulted in quite barren decisions technically in favour of the complainant company), the Euston government steadily refused to work trains over the line until their larger scheme had been carried out. By this scheme the Kensington Canal was to be drained of water, except at the end near the Thames, and turned into a railway, afterwards known as the



BIRMINGHAM, BRISTOL & THAMES JUNCTION (NOW WEST LONDON) RAILWAY AT ACTON.

(*From an old print.*)

The line from the London & North Western Railway crossed the Great Western main line on the level. The aqueduct to the right carries the canal over the railway.

Digitized by Google

"West London *Extension*" line; while the original West London was to be carried over the Great Western main line on a bridge, with a connecting spur (to be made by the Great Western Company), linking it up with the West London Railway at a point known as North Pole Junction. From that signal-box to Kensington the line was to be owned jointly by the Great Western and North Western Companies, who were also to be partners with the London and South Western and the Brighton and South Coast Railways in the ownership of the "Extension." Their ambitious plans, including a bridge across the Thames at Chelsea-Battersea, and sundry curves linking up the new line with both the Southern partners' railways and with Victoria terminus (both London, Chatham and Dover and London Brighton and South Coast sections), were completed early in 1863; though the important new station—"Willesden Junction"—at the northern end of the West London line, was not opened until more than two years afterwards.

With the opening in 1863, quite a new chapter begins in the history of this small line: having failed originally in '44, and slept for some 18 years, it awoke like a kind of sleeping beauty, to a new and—for a while—vigorous life. As a goods and mineral link it has proved most useful but as a passenger line it can hardly be called a success, in spite of the best efforts of the owning companies: the London and North Western officers, especially, have tried almost every possible service, to or from Kensington (Addison Road)* or Willesden Junction, with little response from the general public.

It is true that the railway runs rather on the outer edge of the metropolis, so that nowhere are the stations on the original line or its extension very happily placed, but that could only affect local traffic. For through journeys between the great systems north and south of the Thames respectively, with possible through coaches or trains, the West London line offered great opportunities; but though many such services were tried, little use was ever made of them by the public—with the sole exception of that admirable "Sunny South Express" train, which we hope to see running again now that peace has been duly ratified.

The Northern end of the old line was unaltered (except that it was now a double road), until the new embankment which carried it over the Great Western main line was reached; South of North Pole box both tracks were of mixed gauge, the B.G. rail being carried right into Victoria (London Chatham and Dover station) itself. The original West London property, as distinguished from the "Extension," is usually looked on as ending at Earl's Court Junction box, about 30 chains south of the middle point of Addison Road Station. As this box was not put up until the opening of the District Co.'s line from Earl's Court station (*i.e.*, in 1872) it cannot mark the exact border point,† in fact there seems to have been a bit of the old West London line stretching nearly as far south as the present Lillie Bridge Goods Depôt (L. & N.W.)—this bit of line existed in 1888 as a siding on the east side of Warwick Road coal yard.

The "Extension" Railway, after crossing the Thames, forks South of Battersea station at the Latchmere Junctions into two curves to either side of Clapham-Junction, also into the South Western main line towards Waterloo, and into a long prolongation towards Victoria, which latter links up at "Longhedge" with both the L.B. & S.C. and the L.C. & D. Rys.; in strictness the latter was really—at this point—the "Victoria Station and Pimlico" line, of which the Great Western Company had become part owners.

At the time of opening in 1863, the only passenger station on the West London itself was "Kensington," to which the distinguishing name of "Addison Road"—devised by the Metropolitan,

* Addison Road may be called the Headquarters of the West London system: here until quite lately an official known as "Superintendent of the Line, West London and W.L.E. Railways" had his offices. As each of the companies concerned arranged their own train services, he really controlled little but the Joint uniform staff; he was looked on as an officer of the four companies, but was always himself a London and North Western or a Great Western man.

† According to Airey's maps [1888 edition] this point is 5 chains south of "Earl's Court Junction" box, with the name "Addison Road Junction." But the name is Airey's own invention, and there is no box at this supposed (end-on) junction.

Digitized by Google

or the District— was afterwards added. This station, standing just south of the bridge under the Hammersmith-Kensington high-road, at first consisted of but one platform, to which north-bound trains had to back. but a second one on the west side was soon added. The station as it now stands, with wide and long platforms having double terminal bays at both ends, is a fine one as to size and general effect, but its verandah roofing is short, most of the considerable platform area being wholly without cover. In spite of its name it is not really in Addison Road; in fact, its west side abuts on a region of villas formerly looked on as part of Fulham ("North End" in its slum days) though now known as "West Kensington." It stands too far West of Kensington High Street to be of much use to the Court Suburb; as a principal London station it has never caught on, somehow.

The other stations are all roadside ones of no particular interest; of these, only Chelsea and Battersea—both on the "Extension"—were open in 1863. But a wholly new station, on both the South Western and the Brighton main and suburban lines, was provided as a kind of Southern terminus for the West London system; opened in '63 under the not very happy name of "Clapham-Junction." It has been ingeniously put at a point where the main lines of the South Western and the Brighton Co's. run side by side; a little to the west of where the former Company's Windsor (and Loop) line bears away from the main one, so that the platforms for the Windsor, etc., line trains almost form a separate station, north of those for the two main lines. It replaced a small roadside station known as "Clapham Common" (really at Wandsworth-Common) on the Southampton main line, about half-a-mile further from Waterloo, from which it seemingly drew its unlucky name: one of its many entrances, that on St. John's Hill, may be said to serve part of Wandsworth, but the station itself is in the metropolitan borough of Battersea, whose municipal buildings are within a few

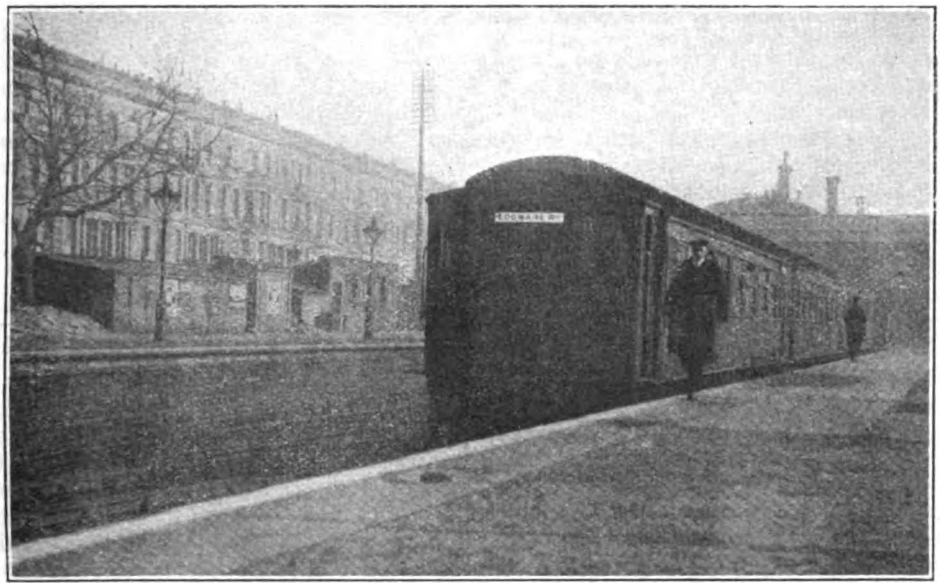


Photo.] [*J. F. Gairns.*

METROPOLITAN AND GREAT WESTERN JOINT STOCK ELECTRIC TRAIN AT ADDISON ROAD.

These trains now operate a shuttle service between Edgware Road and Addison Road where they use one of the northern bay lines for terminal purposes.

Digitized by Google

hundred yards of the new station: any part of Clapham is more than a mile away. The one great shop in an otherwise rather dingy neighbourhood—Arding & Hobbs—uses the station name as its address, but this must be read as a compound word "Clapham-junction," for Clapham itself forms another postal area. Being on the same line of longitude as Paddington (Great Western) it is of course within the County of London; but lying as it does some miles from the main business or residential parts of the Metropolis, it has never been worth much as a London station. In fact, it still ranks on the South Western only as an intermediate station of no great account, even for suburban trains; in 1863 only the slowest of main-line trains of either Company called there; since then it has gradually risen to the rank of a lesser-principal station on the London Brighton and South Coast railway only. Though both curves which link it up with the West London Extension are owned by all four of the leasing Companies, the northern one (only 49 chains in length) is used solely by South Western trains; the southern one, Latchmere *Main* Junction into the London Brighton and South Coast line, 10 chains beyond Clapham-Junction station (64 chains in all), has a back-spur into the Falcon Lane coal yard of the L. & N.W.R. which is owned by the latter Company only.

In March, 1863, (the date from which Great Western trains ran over the West London, etc.; the other owning Companies perhaps began their services a month or two sooner), the train services at Addison Road were as follows (it must be kept in mind that Willesden-Junction station was not opened until more than two years later, so that the L. & N.W. arrangements were to some extent provisional):—

London and North Western Railway.—(1) Kensington to Harrow and vice-versa. Only 3 trains each way: discontinued at end of '65. (2) Euston and Kensington, reversing at the junction-point (virtually at the east end of what is now Willesden Junction), with through coaches to and from Crystal Palace and Croydon: 9 trains each way, calling at Kilburn and at Chalk Farm. [See below, London Brighton and South Coast, No. 1.]

Great Western Railway.—Southall to Victoria (London Chatham and Dover terminus) and vice-versa: 7 trains each way, stopping at intermediate stations in most cases. Connected with Great Western main line or suburban trains at Southall (or by a few up trains, at Ealing).

London, Brighton and South Coast Railway.—(1) Continuation of London and North Western Service No. 2); Kensington and Croydon*, *via* Clapham-Junction and Crystal Palace. 9 trains each way; some calling only at Chelsea, Clapham Junction, Streatham [Hill], Crystal Palace (Croydon line platforms), and Norwood Junction: but some stopped at all stations. On most trains, London, Brighton and South Coast coaches worked through to Euston, and vice-versa. (2) Kensington and Clapham Junction, shuttle service, to and from No. 9 (outside southern) (now No. 12) platform at Clapham-Junction. 12 trains each way, stopping at all stations. [See below London and South Western Railway].

London and South Western Railway.—Kensington and Clapham Junction (No. 2 platform, Windsor line side); shuttle service, stopping at all stations; 15 trains each way. [See above, London, Brighton and South Coast, service No. 2].

NOTE.—The two shuttle services between Addison Road and Clapham-Junction practically made a joint "West London Extension" one; as a rule the trains of each Company alternated with each other, and gave about 27 each way daily to Battersea, and the other roadside stations. These trains are *still running*, and ran throughout the war, though with a considerably attenuated service.

The Euston and Croydon service underwent a good many intermediate changes: early in '64 all trains were semi-fast, giving the go-by to Norwood Junction, stopping only, in fact, at Chelsea, Clapham Junction, Streatham [now Streatham Hill] and Crystal Palace. But two northbound trains ran non-stop, Croydon to Clapham Junction (*via* Selhurst), a way of running which seemingly grew in

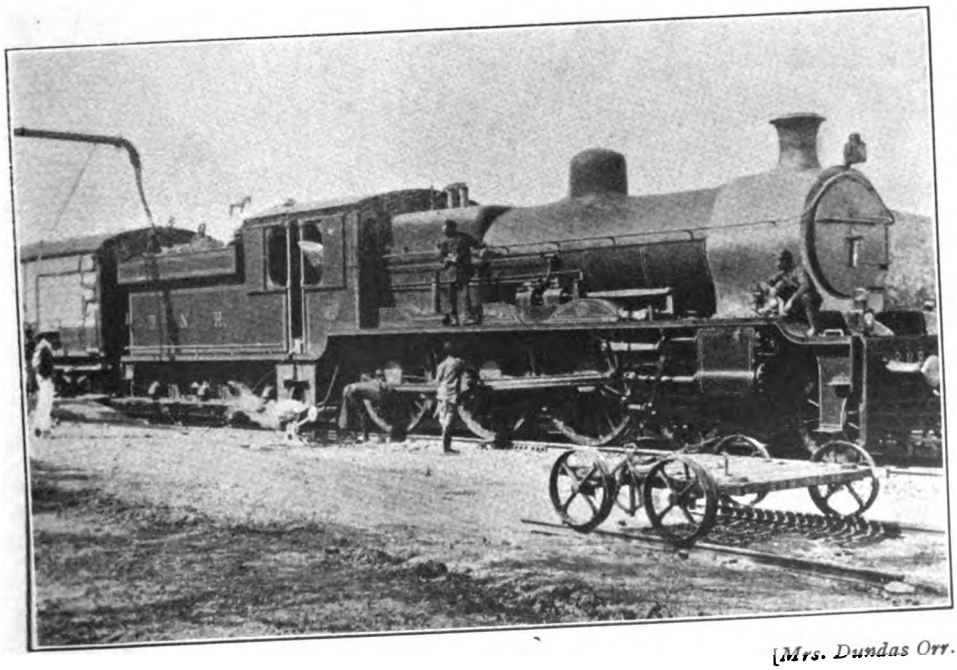
* The Croydon station to and from which these trains ran was the one then called "New"; in reality the suburban platform of East Croydon (L.B. & S.C. main) station. There they gave a connection with some of the Brighton, Hastings and Portsmouth fast trains.

Digitized by Google

favour; for before the end of '66, all the Croydon trains ran by the direct (Balham and Selhurst) route, some even being non-stop Addison Road to Croydon in 22 to 23 mins. But as a rule, Crystal Palace was still served by through Kensington trains, though these were stopping ones: by many trains the front vehicles from Euston were for Croydon, and started thither from Addison Road 5 or 6 mins. after arrival by L. & N.W., to be followed in 10 mins. or so by a slower train for Crystal Palace, with the hinder half of the Euston or Willesden train; similarly, northbound trains from Croydon (direct) and from Crystal Palace met and joined up at Addison Road, going thence to L. & N.W. stations behind one of that company's engines. At a later date (in the 'seventies) the London and North Western ran their own trains to Croydon from Willesden Junction and vice-versa, both engines and coaches being that of the L. & N.W. Company, but this was quite a new service; the earlier one in 1863-4-6, etc., was always worked by the Brighton Company's engines south of Kensington, and the coaches were mostly those of the southern railway, even into Euston terminus. This service gradually dwindled, and seem to have ceased to Croydon about 1869; to and from Crystal Palace it survived until the above-mentioned North Western trains from or to Willesden Junction took its place in 1876.

(To be continued.)

AN INDIAN RAILWAY SCENE: TAKING IN WATER.



[*Mrs. Dundas Orr.*

Photo.] **BENGAL—NAGPUR RAILWAY.**

Bombay to Calcutta Express Mail and Dining Car Train.

Digitized by Google

Locomotive and Train Working in the latter part of the 19th Century.

NORTH BRITISH RAILWAY. [No. I.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE nucleus of the North British system of to-day, though not the earliest of the many lines of which it is composed, may be said to be the original North British Railway from Edinburgh to Berwick, which was opened in 1846 and has always formed part of the East Coast main lines. The powers of the Edinburgh and Hawick Railway, now part of the "Waverley" route, were transferred to the North British Railway in 1845. The continuation of this line from Hawick to Carlisle, known as the Border Union Railway, was not opened until July, 1862. Prior to this, however, the Company had taken over the Edinburgh, Perth and Dundee Railway, of which the lines north of the Forth went for some years under the name of the Edinburgh and Northern. A steam ferry was used between Granton and Burntisland to provide communication between Edinburgh and the section north of the Forth. From Burntisland, the Edinburgh, Perth and Dundee Railway passed through Kirkcaldy to Ladybank Junction, at which point the Perth line diverged to the north-west, and the Dundee line to the north-east. The latter section terminated at Tayport, where another ferry-boat conveyed passengers across the Tay to Broughty Ferry, whence they were taken on to Dundee by the Dundee and Arbroath Railway. There were special steamers on both the Forth and the Tay for conveying goods trains across these rivers.

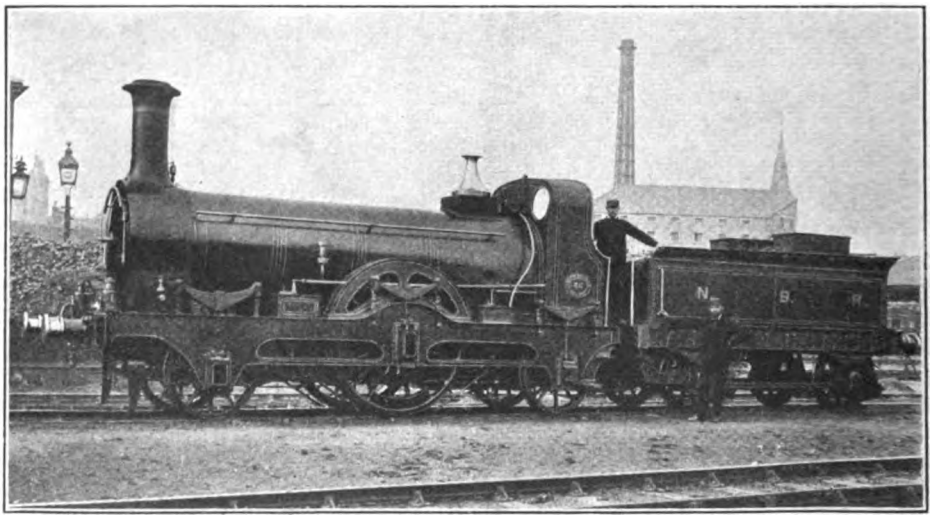


Photo.] [*Loco. Publishing Co., Ltd.*

6 FT. SINGLE LOCOMOTIVE, No. 36, AS REBUILT BY N.B.R., 1867.

Only the principal main lines are enumerated in this short summary, for in reality the present North British is an "omnium gatherum" and a large number of smaller lines, some of considerable importance, were one after the other embraced by the all-devouring tentacles of this octopus.

The most important of these must, however, receive special mention, viz.:

Digitized by Google

the Edinburgh and Glasgow Railway, which itself was an amalgamation of various small railways, chiefly in the Glasgow district, with the parent main line. Amongst these was the oldest railway of all, the Monkland and Kirkintilloch, which dated back to October, 1826. This, with one or two other small railways, combined to form the Monkland Railways, and in their turn these were absorbed by the Edinburgh and Glasgow Railway, the whole being finally amalgamated with the North British in July, 1865.

The Edinburgh and Glasgow main line ante-dated the North British Railway proper by some four years, having been opened in February, 1842 from Glasgow to Haymarket station, Edinburgh, the extension to the Waverley station being made at a later date. It is an exceedingly level line between Cowlairs and Edinburgh, but the descent from Cowlairs to Queen Street station, Glasgow, is at the rate of 1 in 43. The incline was at first worked by means of a hemp rope and a stationary engine, but the hemp rope was a constant source of trouble, so that in 1844 four special 6-coupled locomotives, two of which were the first engines to be built at Cowlairs, were constructed for working the incline. These however, were the source of other troubles, for they knocked the road about very badly, probably owing to the use of light rails. In 1847, the method of rope haulage was again resorted to, but a wire rope was now used. More recently two heavy special brake trucks were attached to the rear of the trains when ascending from Queen street to Cowlairs, these trucks being controlled by special brakesmen. The endless wire rope was attached to the engine by means of another rope twisted round the endless rope, the second rope being connected to an inverted coupling hook on the front buffer beam of the engine. When nearing the top of the incline, the steam of the stationary engine was shut off, and the train engine, then working its hardest, gained on the rope, which dropped from the inverted hook. Trains running down into Queen Street station were controlled by the brakesmen in the special trucks which were attached at Cowlairs, the engine having been detached whilst the train was standing at the ticket platform. The Westinghouse brake was also used in helping to control the trains. It will be noted that the trains departed from Queen Street with the train engine, attached, but those descending into Queen Street arrived with the brake trucks only, and no engine.

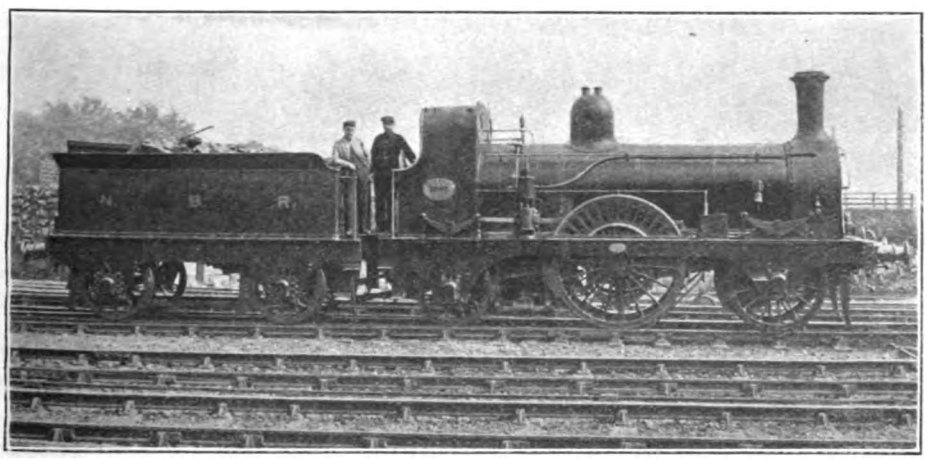


Photo.] [*Loco. Publishing Co., Ltd.*

2-2-2 LOCOMOTIVE No. 1009 (FORMERLY No. 55).

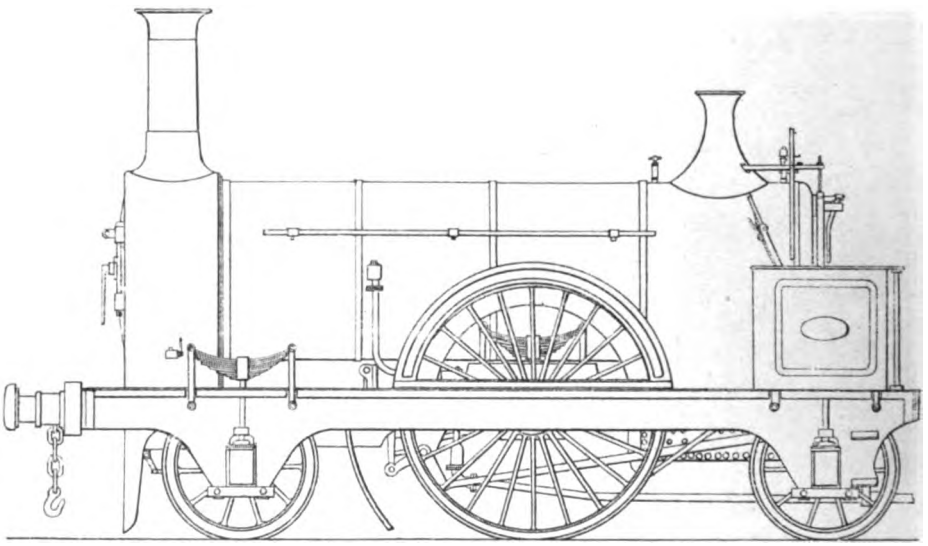
Rebuilt by N.B.R., 1867; reboilered, 1897. Driving wheels, 6 ft. diam.; cylinders, 16 in. by 20 in.

The result of the various amalgamations referred to above has been a network of railways, the chief of which radiate from Edinburgh, so that this

Digitized by Google

city is virtually the centre of gravity of the North British system, whereas Glasgow is that of the Caledonian Railway. Nevertheless Glasgow is of almost equal importance to the North British. At one time there were three locomotive works on the system:—(1) the original North British works at St. Margarets, Edinburgh, at which some engines were built until 1869; (2) the Burntisland works of the Edinburgh, Perth and Dundee Railway, at which no new engines were constructed after 1862; and (3) the Edinburgh and Glasgow works at Cowlairs, which from 1868 became the principal works of the Company, and where all new engines were built, other than those constructed by private firms. All heavy repairs were also concentrated at Cowlairs.

The 453 locomotives of the North British in 1875, when Mr. Dugald Drummond succeeded Mr. Wheatley as locomotive superintendent, were almost as heterogeneous as those of the North Eastern. This was not surprising if the number of railways which went to form the North British be considered. They were of all sorts of shapes and sizes, and, with the exception of those built by Mr. Wheatley at Cowlairs, varied from isolated engines to sets of half a dozen or so of the same class. Mr. Wheatley certainly attempted some sort of standardization of the types which he constructed, more especially of his goods, mineral, and six-coupled tank engines. Of these, there were a fair number in each class, which may be considered as forming standard types of engines. Most of the locomotives of the North British Railway proper, had domes, but the greater proportion of the Edinburgh and Glasgow engines were domeless. In one respect, all of them differed from those on the Caledonian, in that there were very few outside cylinder engines, and such as there were had been taken over from some of the small railways which the North British had annexed. The engines generally had a much more English appearance than those of most of the other Scotch railways of that day, and the Alexander Allan types, of which the Scotch railways were so fond, had only four representatives on the North British, in the shape of 2-4-0 outside cylinder engines, Nos. 401 to 404, which had come from the Forth and Clyde Railway. These engines, however, had their origin in England, having been built at the Canada Works, Birkenhead, in 1858.



SINGLE DRIVING ENGINE, EDINBURGH & GLASGOW RAILWAY.

Built by Beyer, Peacock & Co., 1856–61. Driving wheels, 6 ft. 6 in. diam.; cylinders, 16 in. by 20 in.

Of engines with single driving wheels

Digitized by Google

there were about a dozen remaining when Mr. Wheatley resigned, two only of which were originally the property of the North British. Of these, No. 36 had been built by Messrs. R. and W. Hawthorn, of Newcastle, in 1847, for the express trains over the original Edinburgh and Berwick section of the line, on which it probably worked the earliest "East Coast" expresses. It was, however, so thoroughly rebuilt at St. Margarets in 1867, that I do not think anything remained of the old Hawthorn engine, the outside frames, domeless boiler, and most of the motion being entirely new. The driving wheels of No. 36 were 6 ft. in diameter, and the cylinders 16 in. by 18 in.. It lasted until about 1894.

Another well known "old stager" was No. 55, which had the appearance of a "Jenny Lind," and although the original engine had been built in 1848 by E. B. Wilson & Co., of Leeds, it was constructed on Crampton's patent with rear driving wheels. Its "Jenny Lind" appearance was due to a very severe rebuild by the North British Railway at St. Margarets' works in 1867. The domeless boilers of both 55 and 36 may be noted. The cylinders were 16 in. by 20 in., and the driving wheels 6 ft. in diameter. An extreme peculiarity of No. 55 was that the leading wheels had the large diameter of 4 ft. 6 in., whilst the trailing wheels were only 3 ft. 6 in. diameter. The latter pair had originally been the intermediate wheels of the old Crampton, and were removed to the trailing end when the engine was rebuilt. No. 55 was a hardy veteran, so much so that it afterwards received a Drummond boiler with dome, and was provided with a cab. The date plate on the engine indicated the year 1877, but I am inclined to think that the 1877 boiler came from another engine at a later date. It was eventually renumbered 1009, and ended its days in the present century on the Ladybank and Perth branch, formerly a portion of the Edinburgh, Perth and Dundee Railway.

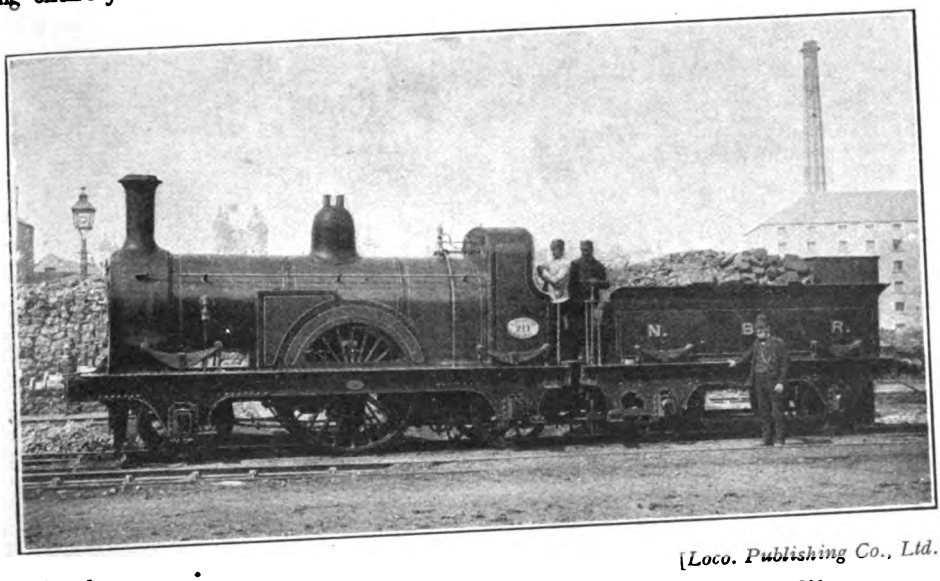


Photo.] [Loco. Publishing Co., Ltd.

EDINBURGH & GLASGOW RAILWAY SINGLE ENGINE, No. 211.

As rebuilt 1880 by Mr. D. Drummond.

There had also been a number of the well known Sharp's single engines, with 5 ft. 6 in. driving wheels, and 15 in. by 20 in. cylinders, previously part of the Edinburgh and Glasgow locomotive stock. Of the six engines of this class built in 1848, only two, Nos. 225 and 227 were in service when Mr. Drummond took charge. These had been rebuilt

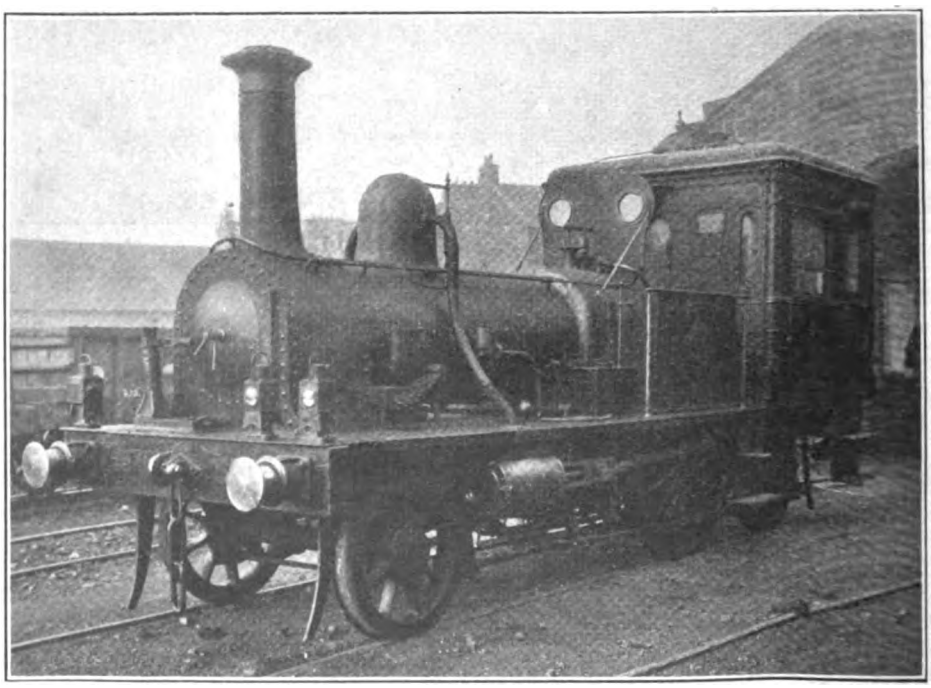
Digitized by Google

at Cowlairs in 1867-68 with domeless boilers, and 227 lasted until the early nineties, before being scrapped.

But the finest and best known of the North British single engines were Nos. 211 to 218, built 1856 to 1861 for the Edinburgh and Glasgow fast train service by Beyer, Peacock & Co., who designed them to the general instructions of Mr. Paton, the locomotive superintendent of that line from 1842 until 1861. These engines had 6 ft. 6 in. driving wheels and 16 in. by 20 in. cylinders. The solid plate frames were inside the driving wheels, which had inside bearings only, but the leading and trailing wheels, 3 ft. 6 in. diameter, had outside bearings only. The boilers were domeless and had flush fireboxes. These eight engines were the mainstay of the Edinburgh and Glasgow express traffic for many years, and were stationed at Haymarket (Edinburgh) and Cowlairs (Glasgow) for that purpose. Two of them, Nos. 213 and 216, were reboilered by Mr. Wheatley in 1875 and 1873, No. 216 having the driving wheels reduced to 6 ft. The six remaining engines were rebuilt in 1880 by Mr. Drummond, who enlarged the cylinders to 16 in. by 22 in., and named them after stations, mostly on the Edinburgh and Glasgow section, as follows :—

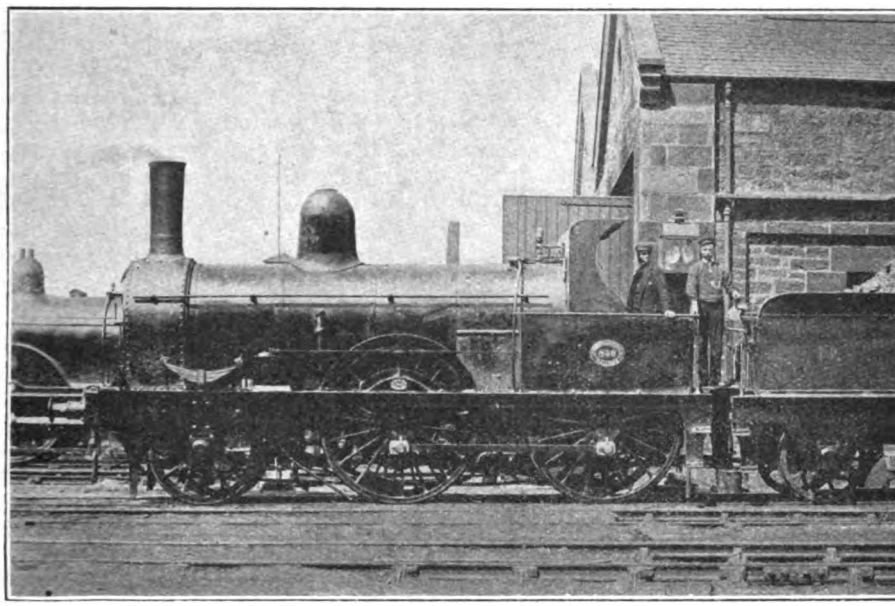
211 *Haymarket*	215 *Newcastle*
212 *Corstorphine*	217 *Castlecary*
214 *Lenzie*	218 *Winchburgh*

At the same time 213 was named *Dullatur*. Afterwards, during the superintendency of Mr. Holmes, two or three of these engines were transferred to the cross-country branch which connects Riccarton Junction on the Waverley route with Hexham on the Newcastle and Carlisle section of the North Eastern Railway, over which the North British worked their own trains into Newcastle. The 211 class, which were finally given odd numbers above 1000, disappeared only a few years ago, and almost to the last some of them were to be found on their old Edinburgh and Glasgow line. They were great favourites, and it may be truthfully added that they were, for their size, amongst



SINGLE-DRIVER TANK ENGINE, No. 312, FITTED FOR INSPECTION PURPOSES.
Built for the Edinburgh & Glasgow Railway, 1850, by Neilson & Co. Rebuilt 1870.
Driving wheels, 5 ft. diam. Cylinders, 10 in. by 14 in.

Digitized by Google



2-4-0 ENGINE, No. 859 (FORMERLY CLASS 90 to 95).

Built by Neilson & Co., 1860. Rebuilt 1874. Coupled wheels, 6 ft. diam. Cylinders, 16 in. by 20 in.

the best engines that the North British ever possessed.

Of four-coupled engines which may be classified as "express," there were in 1875 only eight, and judging from the samples of express trains which the Company then ran, it is hardly too much to say that there were about eight more than were required. For the Edinburgh and Glasgow section was, in general, well served by the Beyer, Peacock's singles, and the East Coast expresses between Edinburgh and Berwick were worked by North Eastern engines. After deducting these express services from the total, there was hardly anything left that could not have been worked quite satisfactorily by a very ordinary passenger engine, and I am not sure that some of the North British so-called fast trains of that day would have suffered much if they had been put under the charge of a bus-horse.

The first two of the four-coupled express engines to be mentioned were Nos. 141 and 164, built at Cowlairs works in 1869. They were 2-4-0 engines having inside frames throughout, domeless flush boilers and Salter's spring balance safety valves over the fireboxes. The coupled wheels were 6 ft. 6 in. in diameter, the leading wheels 4 ft., and the cylinders, when the engines were originally built were 16 in. by 24 in., though they were afterwards enlarged to 17 in. by 24 in. I know very little of the work done by these engines. Both were rebuilt by Mr. Holmes in 1890, with the standard type of modern North British boiler, after which 141 ran for some years between Dundee and Glasgow.

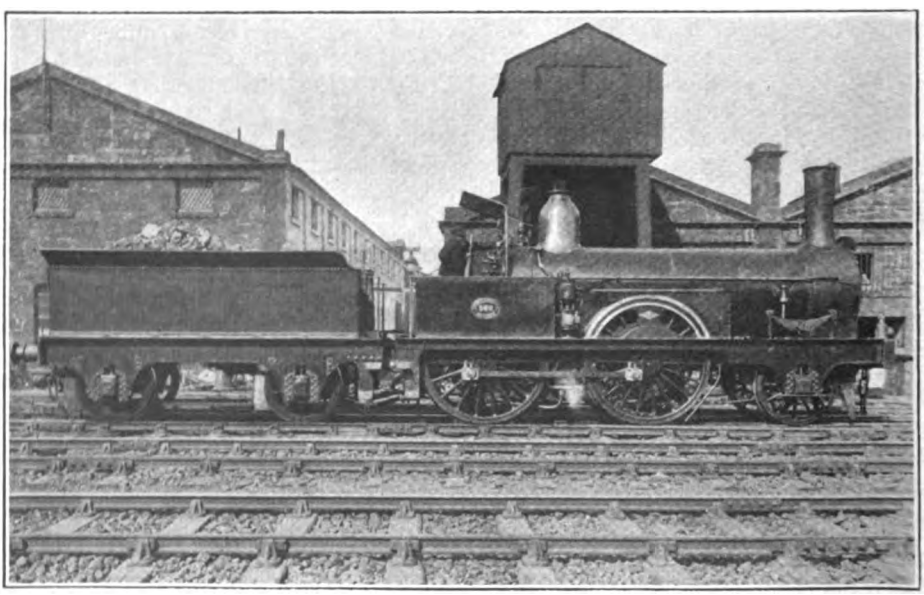
The two express engines which followed, Nos. 224 and 264, were built at Cowlairs in 1871, and merit special mention. In the first place they were the two first engines to be built of the standard British 4-4-0 type with inside frames throughout and inside cylinders, and the credit for evolving this type belongs to Mr. Wheatley. The cylinders were 17 in. by 24 in., and the diameter of the coupled wheels was 6 ft. 6 in. The bogie wheels were only 2 ft. 9 in. in diameter, and the wheel centres had the peculiarity of being solid discs without spokes. There were later engines with solid bogie wheels centres, not only on the North British but also on the London and South Western, nevertheless, the design has not found much favour in this country, principally because the

Digitized by Google

weight of the wheel itself, which is dead weight on the rails and not supported by the springs, is increased. The boilers had flush fireboxes above which domes were placed. The heating surface of the tubes was 894 sq. ft., and of the firebox 87 sq. ft., making a total of 981 sq. ft. The coupled wheels were only spaced 7 ft. 7 in. apart, centre to centre, so that a small firebox and grate resulted, the area of the latter being only 15¾ sq. ft. The weight in working order was 36 tons, of which 24 tons 14 cwt. were carried by the coupled wheels.

Probably there is no other engine in the country—I write "is" because it is still at work—that has had a more adventurous and strange career than No. 224, for it was this engine that went down into the river on the occasion of the Tay Bridge disaster of 1879. Afterwards it underwent a somewhat startling metamorphosis, which I shall mention later when its career will be given in greater detail.

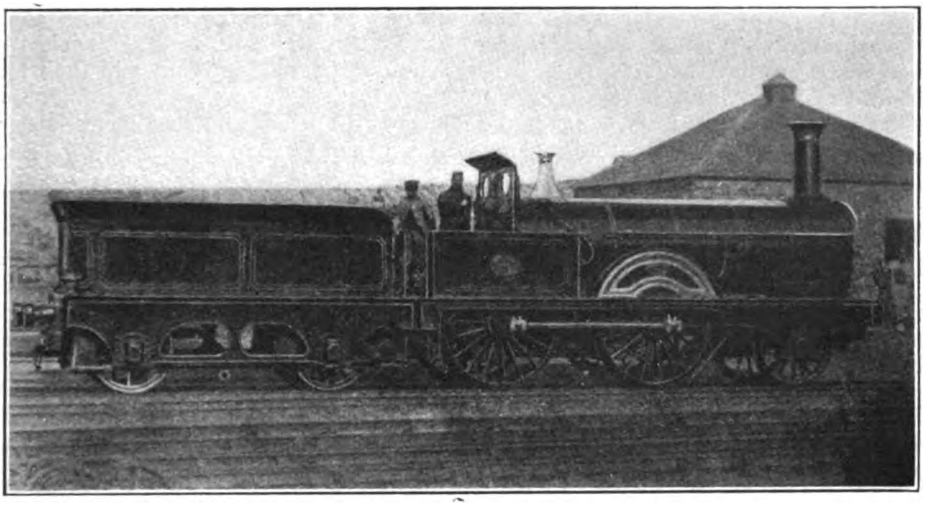
Four more 4-4-0 engines, Nos. 420 to 423, of very similar type, but differing from 224 in several respects, were built at Cowlairs in 1873, also, with 6 ft. 6 in. wheels and 17 in. by 24 in. cylinders. The bogie wheels of these also had solid centres, but were 3 ft. 4 in. instead of 2 ft. 9 in. The coupled wheel-base was 2 in. longer, and the domes, which were of a plainer round-topped pattern, were placed on the middle of the boilers. The 420 class were about 1¾ tons heavier than 224. The outward appearance of all these bogie engines, especially of the 224 class, was elaborately ornate, and their "architecture" conveyed a reminder of the "Gothic." I never heard that they did very much in the way of fast express work, but then this may not have been their fault, for in their early days there was very little in this way to be done. 224 always had a special liking for the Dundee district, and even when it disappeared from there for a time, it generally managed to find its way back again, before very long. Nos. 420 to 423 and 264 assisted for a time on the Edinburgh and Glasgow fast and slow train services, and they also ran between Edinburgh and Carlisle before 1876, when these trains were in the nature of cross-country locals. When the Waverley route became a main line connection for the Midland Scotch train services, No. 421 was fitted with the Westinghouse brake and worked over this route for a very



2-4-0 ENGINE, No. 342 (CLASS 341-346.)

Built by Dübs & Co., 1865. Coupled wheels, 6 ft. diam. Cylinders, 16 in. by 20 in.

Digitized by Google



2-4-0 ENGINE, No. 385 (CLASS 382-393).

Built by Neilson & Co., 1866–7. Coupled wheels, 6 ft. diam. Cylinders, 16 in. by 20 in.

short time. But this work was in the nature of a stop-gap, and the 420 class disappeared from the Waverley route as soon as Mr. Drummond's larger bogie engines of the 476 class came out. It is tolerably certain that the Waverley route would have been much too severe for small engines like the 420 class for anything but lightly loaded slow trains. Mr. Holmes rebuilt 420-423 in 1887 and 1890, and although afterwards on the duplicate list, they were at work until 1916 as Nos. 1241 to 1244.

Having described the express engines which existed in 1875, some account may be given of the express train services of that period. The original main line between Edinburgh and Berwick need not be taken into consideration, since in the year 1869, the North British sold its birthright to the North Eastern for a mess of pottage, in so far as the through East Coast express services were concerned, and all the trains worthy of the title of "express," were worked by North, Eastern engines right through between Newcastle and Edinburgh, although all trains stopped at Berwick. I do not know the why and the wherefore of this arrangement, but the net result appears to have been that the North Eastern metaphorically sat down on the North British metals with a kind of "beati possidentes" expression on its countenance, and having made itself very comfortable, was not to be dislodged. But more of this later. A number of stopping passenger trains and all the goods trains were worked between Edinburgh and Berwick by the North British engines, and this Company also obtained an entry into Newcastle by working a service of cross-country slow trains from Riccarton Junction on the Carlisle-Edinburgh line, through Reedmouth to Hexham, whence they travelled over the "Newcastle-Carlisle section to Newcastle.

In 1875 the North British at Carlisle was dependent upon the few crumbs that fell from the London and North Western table, and the Caledonian Railway took good care that there were not many of these For the Midland through route from Settle to Carlisle was not opened for passenger traffic until May, 1876, and consequently the North British trains over the Waverley route made their connections with the West Coast expresses to and from Euston

The fastest down train from Carlisle was the 7.5 p.m. which connected with the 10.10 a.m. from Euston. It reached Edinburgh at 10.20 p.m., and made nine intermediate stops, the journey speed throughout being just 30 m.p.h.

Digitized by Google

The fastest up train, the 10.15 a.m., from Edinburgh, was somewhat better, and reached Carlisle at 1.15 p.m., with five intermediate stops. Its best run was from Hawick to Carlisle, 45½ miles, in 1h. 18 min., at a running average of 35 m.p.h. This, of course, includes the 11 mile bank from Hawick to the summit near Riccarton, which is mostly at 1 in 75 to 1 in 100. The engines used were, I believe, Mr. Wheatley's 4-4-0 engines of the 420 class.

(*To be continued.*)

PETROL RAIL MOTOR CAR: NEW SOUTH WALES GOVERNMENT RAILWAYS.

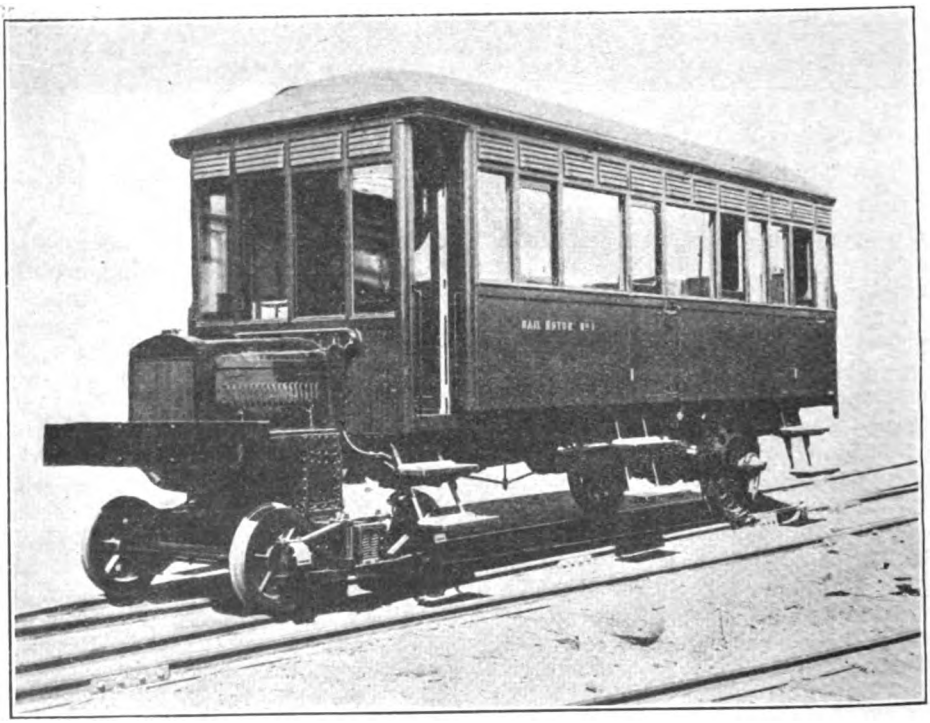


Photo.] [*C. F. Dewey.*

RECENTLY the New South Wales Railway Commissioners introduced a rail-motor service on the Lismore line, an isolated section on the North Coast, and we are indebted to Mr. C. F. Dewey for the photograph reproduced and the following particulars:

The motor car was provided by converting and lengthening to 8 ft. 6 in. the chassis of a five-ton Moreland motor lorry. The front pair of wheels were also replaced by a four-wheeled bogie. The car body provides seating accommodation for 33 passengers, and was designed and constructed at the carriage and wagon shops of the system at Eveleigh, Sydney.

Before being placed in service a severe trial run was made, and proved in every way to be most successful; a 1 in 40 grade being taken at a speed of 18 m.p.h. The time-table has been arranged for speeds up to 25 m.p.h. and if found satisfactory in continued service similar rail-motor services will be introduced on other branch lines.

Digitized by Google

Transport Development in West London.

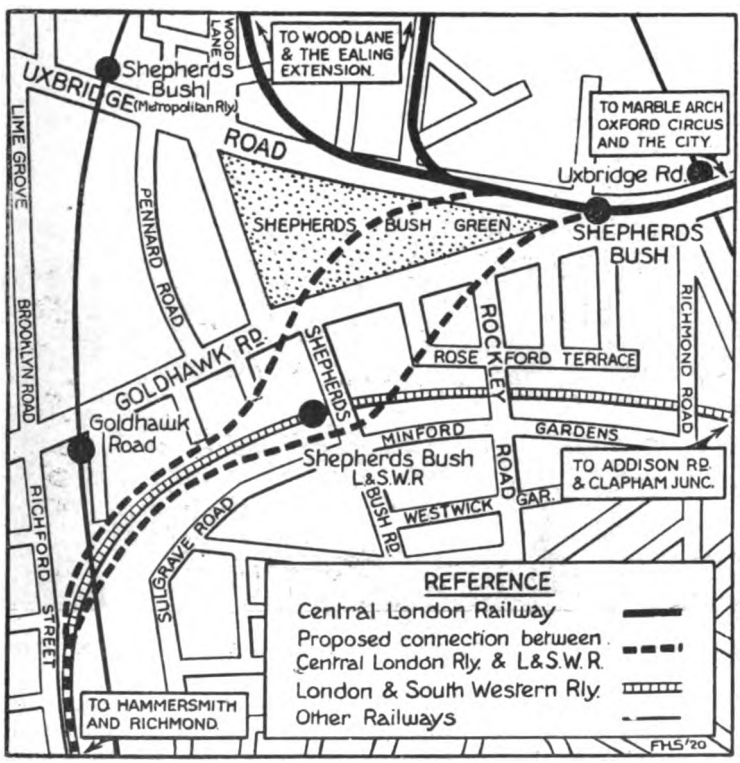
AN IMPORTANT NEW LINK BETWEEN THE CENTRAL LONDON AND LONDON & SOUTH WESTERN RAILWAYS.

By FRANK GILBERT.

AT a special Wharncliffe Meeting held at Waterloo Station on Friday, February 20, the London and South Western Railway Company decided to give their support to the Bill, promoted by the Central London and Metropolitan District Railway Companies, asking for powers to effect a junction between the Central London and the London and South Western Railways at Shepherd's Bush. This promise of support is important for it removes what might have proved a serious stumbling block to the success of the scheme.

The Central London Company are applying for powers to construct three short railways :—

(1) Commencing by a junction with the existing (Central London) Railway at a point a few yards to the west of Shepherd's Bush Station and joining up with the "down" line of the London and South Western Railway at a point three hundred yards from the western



PLAN SHOWING CONNECTIONS PROPOSED BETWEEN THE CENTRAL LONDON AND LONDON & SOUTH WESTERN RAILWAYS AT SHEPHERD'S BUSH.

Digitized by Google

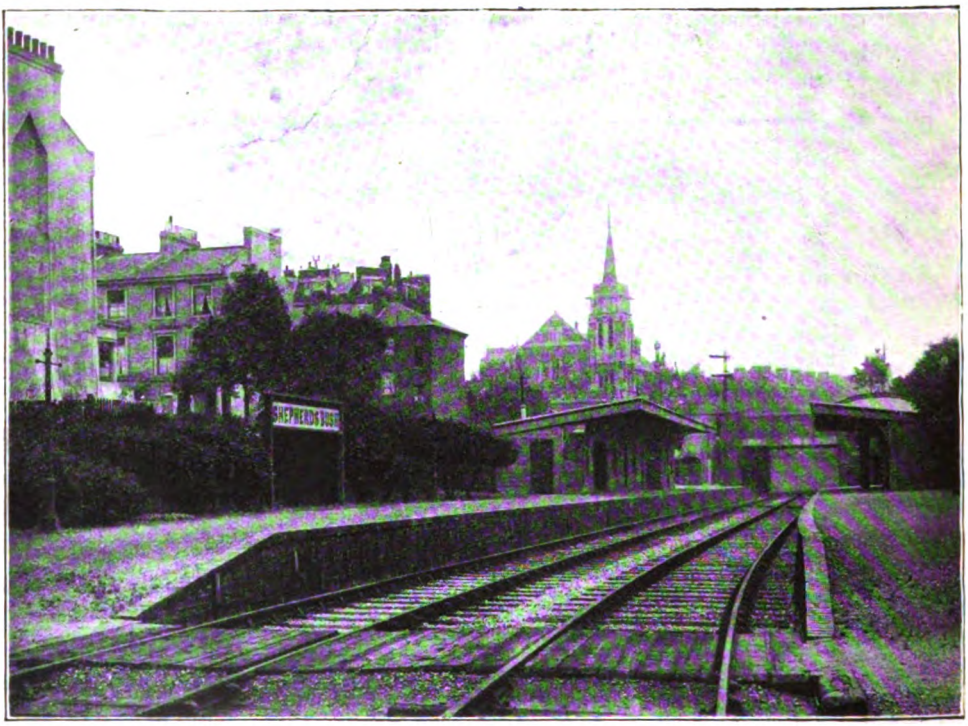
end of the "down" platform at Shepherd's Bush (London and South Western) Station.

(2) Commencing by a junction with the existing (Central London) railway, at a point about ninety yards to the west of Shepherd's Bush Station, and joining up with the "up" line of the London and South Western Railway at a point three hundred yards from the western end of the "up" platform at Shepherd's Bush (London and South Western) Station.

(3) This joins up proposed railway No. 1 with the existing (Central London) railway, 65 yards north of Uxbridge Road.

Parliamentary Powers for which application is made will also enable the Central London and the London and South Western Companies to enter into agreements as to the construction, working, and use of the proposed new railways, and for the London and South Western Company to contribute towards their construction. Moreover, the powers will include permission for the granting of running powers to the Central London Railway over the Kensington and Richmond Branch of the London and South Western Railway.

In 1913, the Central London Company applied for, and obtained, powers to link up their system with the London and South Western Railway at Gunnersbury, but the present proposals necessitate a much shorter length of new railway for, if approved, the actual junction will be effected at a point a few yards to the west of the point where the bridge of the Great Western and Metropolitan Railway (carrying the trains of the Hammersmith and City Railway and, up to some six or seven years ago, the trains of the Great Western Railway to Richmond) crosses the London and South Western Railway.



SHEPHERD'S BUSH STATION· LONDON & SOUTH WESTERN RAILWAY.

During the war, the London and South Western line, as between Kensington and Ravenscourt Park, was closed and has not yet been reopened. From Ravenscourt Park onwards to Richmond the District Company traverses London and South Western property,

Digitized by Google

but only its own tracks are electrified, as far as the junctions beyond Turnham Green, so that it will be necessary to equip the remaining lines from the point where the Central London Company propose to join it. Most likely this new electrification will be continued as far as Kensington (Addison Road), and as a result of this comparatively small new construction, very far-reaching possibilities of immense advantages to the travelling public will be created, greatly out of all proportion to the cost entailed.

At present, the Central London Railway terminates at Liverpool Street and at Wood Lane. The extension from the latter station to Ealing has already been constructed, and Lord Ashfield stated recently that as soon as the new coaches were delivered he hoped the line would be opened for public traffic. This new line turns away from Wood Lane in a northerly direction, then curving to the west and passing through North Acton, to reach Ealing at the Great Western station.

The proposed line will turn south from Shepherd's Bush Station, pass under the London and South Western Railway at the Kensington end of Shepherd's Bush (London and South Western) station, emerge from the tunnel on the "down" side of the station and link up with the London and South Western tracks about 300 yards from the western end of the "down" platform.

A view is reproduced showing Shepherd's Bush (London and South Western) station, looking towards Kensington (Addison Road). The bridge in the distance is that carrying Shepherd's Bush Road—which runs from Goldhawk Road to Hammersmith Broadway. The station presents a curious appearance at the time of writing. The permanent way is overgrown with grass and weeds, and one might well imagine oneself at a little country station, far from the roar of passing L.C.C. trams, L.G.O.C. 'buses, and other typical London traffic. Adjoining the station, the land, now devoted to allotments—and which will soon be diverted from that purpose—adds to the rural aspect of the place. At one time the station was quite prosperous, offering direct connections with Waterloo, Clapham Junction, Ludgate Hill, and Richmond, etc. But 'buses, trams, and tubes wooed the public fancy more successfully than the steam trains, and the traffic consequently dwindled. The station was closed on June 5, 1916.

It is anticipated that electrification will have a revivifying effect on this admirably situated station, and the same remarks apply equally to Hammersmith (The Grove) station, also illustrated. This latter station will be the first to come under the joint control of the London and South Western and Central London Companies.

If the existing line from the new junction is electrified in the direction of Kensington (Addison Road), still another link will be created, connecting at that station with London and North Western electric trains running between Earl's Court and Willesden, and London and South Western and London Brighton and South Coast steam trains to and from Clapham Junction. This may open up quite a new era in transportation in West London.

By linking up with the London and South Western Railway at Shepherd's Bush the Central London will be able to offer direct services between Richmond and the heart of the City. The shopping centres of Oxford Street, Regent Street, Bond Street and Holborn will become more accessable than ever to dwellers in the Thames Valley, St. Margarets, Twickenham, Teddington, Hampton, Sun bury, Kingston, Shepperton, Surbiton, etc., by changing at Richmond from London and South Western electric and steam trains.

It must be presumed that, at no distant date, it will become necessary to study the problem (even more carefully than it has already been studied) of establishing a physical connection at Richmond with the Thames Valley stations, to enable travellers from the City, theatreland, and the great emporiums to travel through to those stations without change of carriage.

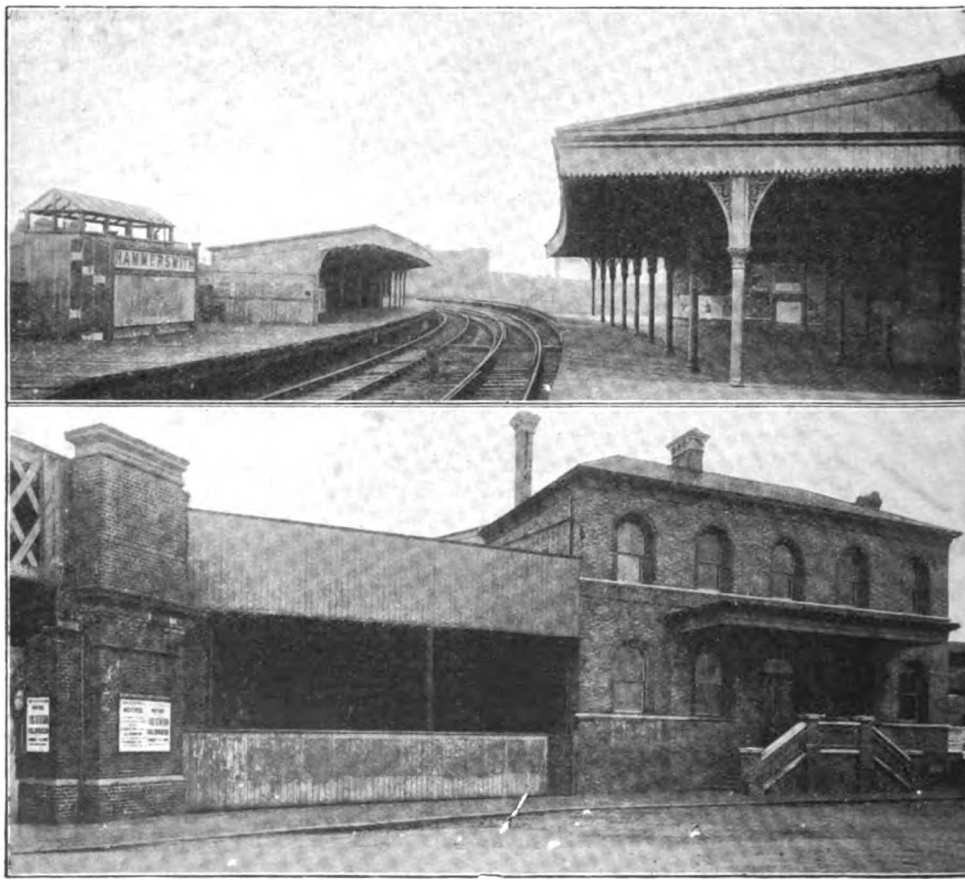
"Windsor to Liverpool Street, via Richmond and Shepherd's Bush, by electric railway throughout, without a change" may become a reality before many years pass, and the journey per-

Digitized by Google

formed in much less time and under more comfortable conditions than is at present possible via either Waterloo or Paddington. We may even see advertised special through electric trains from the Bank to Ascot, during the Race Week, if the proposition of links at Shepherd's Bush and Richmond materialise, and if the South Western Company electrifies its Windsor and Reading lines.

The great army of shopworkers, clerks, and business folk, who live in the Western suburbs and by the Thames, and who work in the City and West End will find the new link a great boon. Whereas at present they have either to travel by omnibus—or cross to Waterloo on the Bakerloo, or the Waterloo and City Railway—or take Central London Railway train to Shepherd's Bush and change there into the comparatively slow-moving trams—or pick up a crowded District train at Hammersmith or Charing Cross, they will be easily enabled to travel to and from their homes direct in comfort by the Central London trains via Shepherd's Bush and Hammersmith (The Grove.)

The new link will undoubtedly have a considerable effect on the prevailing congestion on the tubes, the London and South Western Suburban lines, the trams, the omnibuses, the District, and the Waterloo and City Railway.



HAMMERSHITH (THE GROVE) STATION, LONDON & SOUTH WESTERN RAILWAY.
Interior and Exterior Views.

At present the rail services offered from Richmond to the City are by the District to Hammersmith, continuing to City stations or changing into Metropolitan trains, by London & North Western electric trains to Broad Street via Willesdon Junction, or by South Western

Digitized by Google

to Waterloo, changing there to the Waterloo and City line. The latter railway (in common with others) is very congested during the rush hours, but the Directors are very much alive to the situation, for the Chairman (Brigadier-General Hugh W. Drummond, C.M.G.), said recently: "So far as the overcrowding is concerned, we have determined to do two things. First, to supersede the present electrical equipment, which is out of date, by modern equipment, so as to increase the speed of the trains up the inclines. This will enable us to run 24 trains an hour instead of 20. We are also ordering some additional all-steel coaches, so as to lengthen the trains to six coaches instead of five. By these means we shall increase the seating capacity from 68 seats to 102 seats per minute, or by exactly 50 per cent." The new link now being discussed may have an exceedingly important bearing on the traffic carried by the Waterloo and City and South Western Railways.

It is interesting to note that the three operating systems in use over the electrified sections of the London and South Western, the District and the Central London lines, differ in several important respects, and will necessitate alterations and adaptations to enable through trains to run over the lines mentioned, or the provision of special equipment. There are many other minor points which will need careful study and attention, but it may be safely assumed that they will be satisfactorily handled by the staffs of the companies concerned.

At a meeting held in December last, the Hammersmith Borough Council decided to adopt a report that a Petition should be presented against the Bill in both Houses of Parliament, with a view to the Bill being, if deemed necessary, opposed in Committee. This action was taken for the preservation and protection of the property, rights and interests of the Council.

It is to be hoped, however, that the promoters of the Bill will succeed in getting it passed through both Houses of Parliament, and placed on the Statute Book, and that the Railway Companies will lose no time—once they possess the requisite powers—in beginning construction of the new lines. The possibilities made open as a result of the linking up may have such a powerful influence on the London Traffic problem and bring enormous advantages to the travelling public, that the Bill must surely have the blessing of all who hope to see London's Transportation system the best in the world.

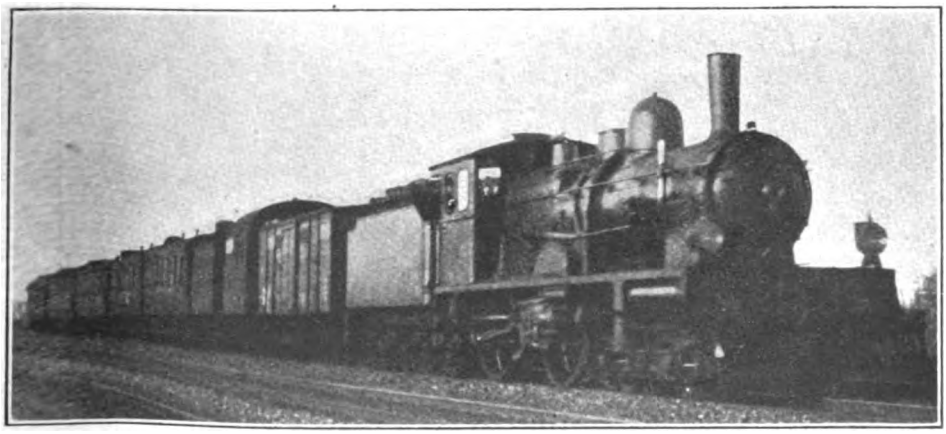
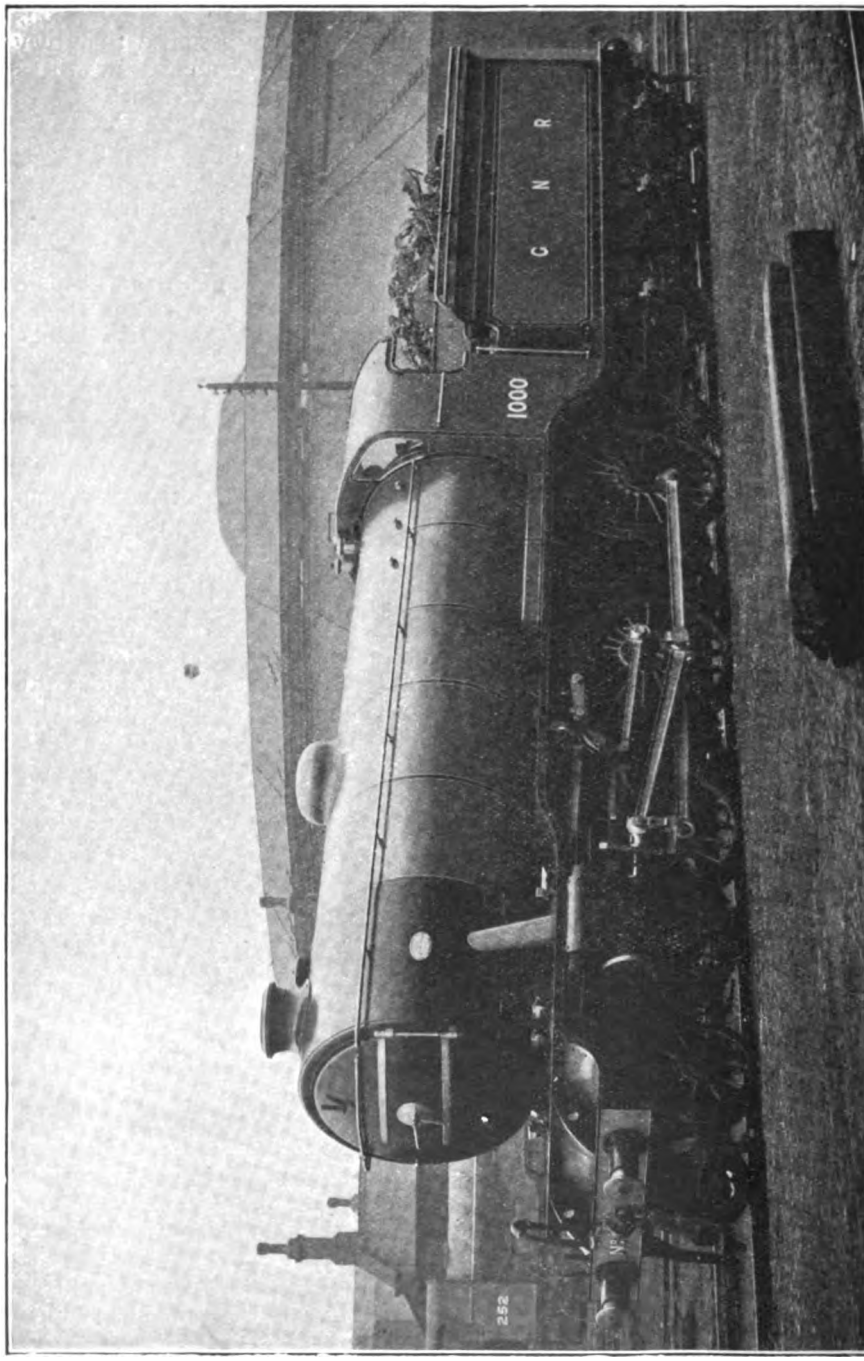


Photo.] **ALSACE-LORRAINE RAILWAYS.** [*W. H. C. Kelland.*

4-4-0 four-cylinder compound locomotive on local train at Hagenau.

Digitized by Google



NEW 2-6-0 THREE-CYLINDER EXPRESS GOODS LOCOMOTIVE, GREAT NORTHERN RAILWAY.

Digitized by Google

New 2-6-0 Express Goods Locomotive: Great Northern Railway.

Designed by MR. H. N. GRESLEY, Locomotive Engineer.

MR. GRESLEY'S now well known 2-6-0 mixed traffic locomotives have attained so high a reputation for all-round efficiency that the appearance of an enlarged class, including also the use of three high-pressure cylinders on the lines which have proved so successful in the case of his 2-8-0 engine, No. 461, is a natural development.

As will be seen from the general view of No. 1000, the engine includes all the standard Gresley characteristics, and suggests not only decided capabilities in regard to express goods train working, but also for heavy passenger service at moderately high speeds when occasion demands.

Leading dimensions are as follows :—

Cylinders (3)	18½ in. by 26 in.
Coupled wheels	5 ft. 8 in. diam.
Leading wheels	3 ft. 2 in. diam.
Wheelbase, rigid	16 ft. 3 in.
,, (engine) total ..	25 ft. 2 in.
,, engine and tender	48 ft. 2 in.
Boiler diameter (outside) ..	6 ft.
Length, between tube plates	11 ft. 11⅞ in.
Firebox length (outside) ..	9 ft.

HEATING SURFACE.

217 tubes 1¾ in. ext diam.	1,192 sq. ft.
32 ,, 5¼ in ,, ,,	527 ,, ,,
	1,719 ,, ,,
Firebox	182 ,, ,,
Total	1,901 ,, ,,
32 element superheater tubes 1¼ in, internal diameter ..	407 ,, ,,
Total	2,308 ,, ,,
Grate area	28 ,, ,,
Boiler pressure	180 lbs.
Weight of engine and tender in working order ..	114 tons 16 cwt.

The boiler barrel has a diam. of 6 ft. and a length, over the smoke-box ring, of 12 ft. It is formed in one plate, and has its centre placed 9 ft. above the level of the rails. It contains Robinson superheating apparatus, with 32 elements arranged in four rows of eight, above the ordinary fire tubes. The firebox is 9 ft. in length outside, and is fitted with a sloping back plate. Ross safety valves, loaded for a working pressure of 180 lb. per sq. in., are mounted upon it.

The outside cylinders are inclined at 1 in 30, and the inside cylinder at 1 in 8½. The piston-valve steam chests of the outside cylinders are above, and those of the inside cylinder at the side of the ports, all three steam chests being in the same transverse plane. Steam is distributed to the outside cylinders by Walschaert valve motion direct, and to the inside cylinder by a simple system of rocking levers, whereby the desired action is obtained from the two outside valve gears. Ball bearings are used for the return crank-pin.

An interesting detail is the arrangement of the regulator handle in the cab. Two handles are provided, one at each end of a cross shaft spanning the full width of the firebox near the top, the handles pointing downwards at an angle which conveniently off-sets them from the firebox face. Thus the regulator valve in the dome can be operated from either side of the footplate with equal readiness.

When it is considered that this engine has about the largest boiler that can conveniently be used, in the matter of diameter and height, and that its considerable area of heating surface is attained without resorting to long tubes, and with cylinders capable of exerting a tractive force of over 30,000 lb., with adhesion 60 tons, a factor of 4.5 being obtained, a weight of 71 tons 14 cwt. must be accepted as a highly favourable result. It is contributed to some extent by the very careful designing of the motion the parts of which latter have been reduced in weight by the employment of heat-treated alloy steel.

The tender is of the standard Great Northern type, fitted wtih water pick-up apparatus, and it is carried upon six wheels, 4 ft. 2 in. diam., and has a wheelbase of 13 ft. The water capacity is 3,500 gallons, and a fuel space of 6½ tons is provided. The weight of the tender fully loaded is 43 tons 2 cwt.

Digitized by Google

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

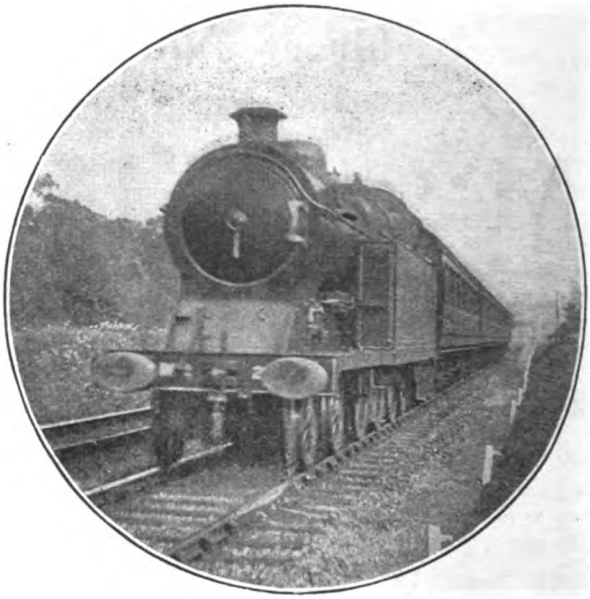


Photo.] [*K. A. C. R. Nunn.*

GREAT CENTRAL RAILWAY.

4-6-2 superheater tank engine on suburban train.

WITH the object, as he states, of promoting "a little healthy discussion, such as there was in the days of the late Mr. Rous-Marten," a Swindon correspondent writes as follows on the relation between heating surface and cylinder dimensions in recent British locomotive designs. "In the days of the Stirling singles on the G.N.R.," he commences, "it was beginning to be considered bad practice to over-cylinder an engine, but the final batch of these locomotives had cylinders 19½ in. diam. by 28 in. stroke, with a boiler having 1,032 sq. ft. of heating surface. This gives a ratio of 16·2 cubic in. of cylinder volume to 1 square foot of heating surface. Severe criticisms were passed on these engines at the time. Then came Ivatt's '251' class 'Atlantics,' with 2,500 sq. ft. of heating surface and 18¾ in. by 24 in. cylinders, completely turning the tables with a ratio of 5·0 cubic in. per sq. ft. These latter seemed to set the fashion for large boilers and moderate-sized cylinders all over the country, till recent years, when we see the boilers getting smaller and the cylinders larger again. This is undoubtedly due in part," the writer proceeds, "to the advent of the superheater, but that cannot account for all of it. The most striking example that has appeared in recent years is the new 3-cylinder 4–8–0 No. 1352,"—it is, of course, the North Eastern Railway class "X" that is here referred to, although these engines, built as far back as 1909, can hardly now possess the merit of novelty—"with three cylinders 18 in. by 26 in., and only 1,310 sq. ft. of heating surface, which gives 15·25 cubic in. of cylinder volume to 1 sq. ft. of heating surface, or nearly as much as the Stirling singles. Other less striking examples are the 'Clan' class and the similar 5 ft. 3 in. mixed traffic 4–6–0 class of the Highland Railway. In about 1909 or 1910 there were very few 4–6–0 or 4–4–2 engines with less than 2,000 sq. ft. of heating surface, but nowadays the average seems to be between 1,600 and 1,800 sq. ft." I do not know how my friend obtained these last figures, which are certainly far from correct. "I cannot help thinking," the letter concludes, "that for cylinders 21 in. by 26 in. at least 2,000 sq.ft. of heating surface should be provided."

From the last sentence it would appear that my correspondent is prepared to design his engines without regard to the

Digitized by Google

particular work that they are expected to perform. He further seems rather to incline to the idea—which is common also to a number of readers, judging by the questions on this topic that are answered in the "Why and Wherefore" pages—that heating surface, apart entirely from its location in the boiler, firebox, or superheater, and from the design of the steaming part of the engine generally, can be used as a dimension in calculating the tractive power of the locomotive as a whole. But this is a mistaken conclusion. Of course there are, and in the nature of things there must be, maximum and minimum limits to the ratio existing between such dimensions as cylinder volume and heating surface in a locomotive but it is the correlation of *all* the leading features and dimensions of the design with the class of work performed and the character of the road traversed that produces the successful and efficient machine. It is on this account that an examination of dimensional ratios alone, and a comparison of them with locomotive performance, often lead to baffling results. For instance, the best hill-climbing records I possess were made by a Great Western Railway "Star" on the one hand, and a London and North Western Railway "Claughton" on the other. The former is a 4-cylinder 4–6–0 class with 14½ in. by 26 in. cylinders, and 2,172 sq. ft. of heating surface, while the latter, a similar type of engine with 16 in. by 26 in. cylinders, has only 2,128 sq. ft. The ratios in these cases are therefore 7·9 and 9·8 cubic in. of cylinder volume to 1 sq. ft. of heating surface respectively. The most extraordinary ratio I know in the case of an express engine is that of the rebuilt and superheated Lancashire and Yorkshire 4–4–0's, with their 20 in. by 26 in. cylinders and 1,096 sq. ft. of heating surface; and yet with one of these engines I recorded the fastest running on the Liverpool-Manchester service that I have ever experienced on that route. At the other extreme we have the Great Northern Railway "Atlantics," mentioned by my correspondent, with cylinders, even subsequent to superheating, only 20 in. by 24 in., despite a total heating surface of 2,396 sq. ft. It would be difficult to find engines more capable than the latter

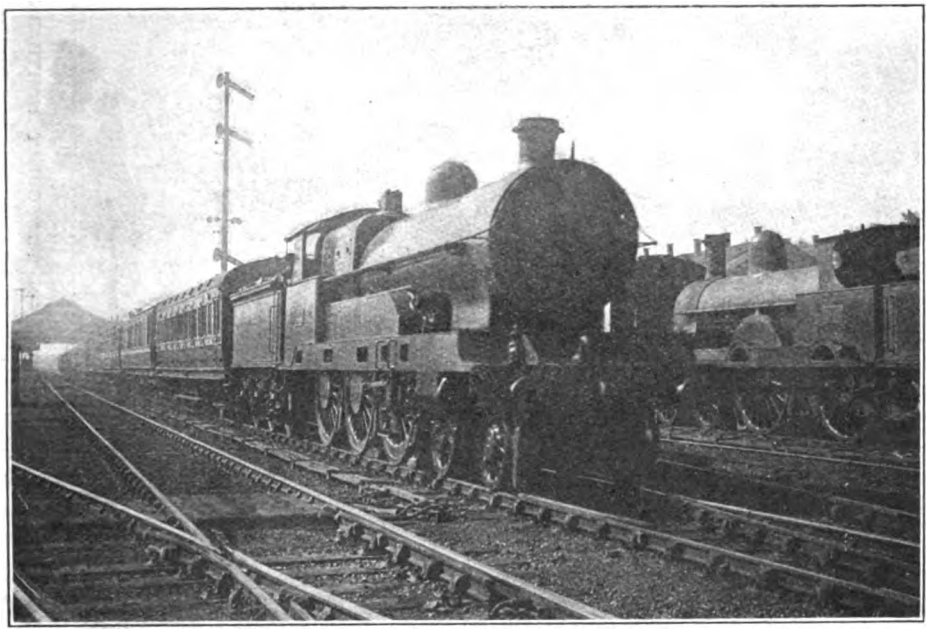
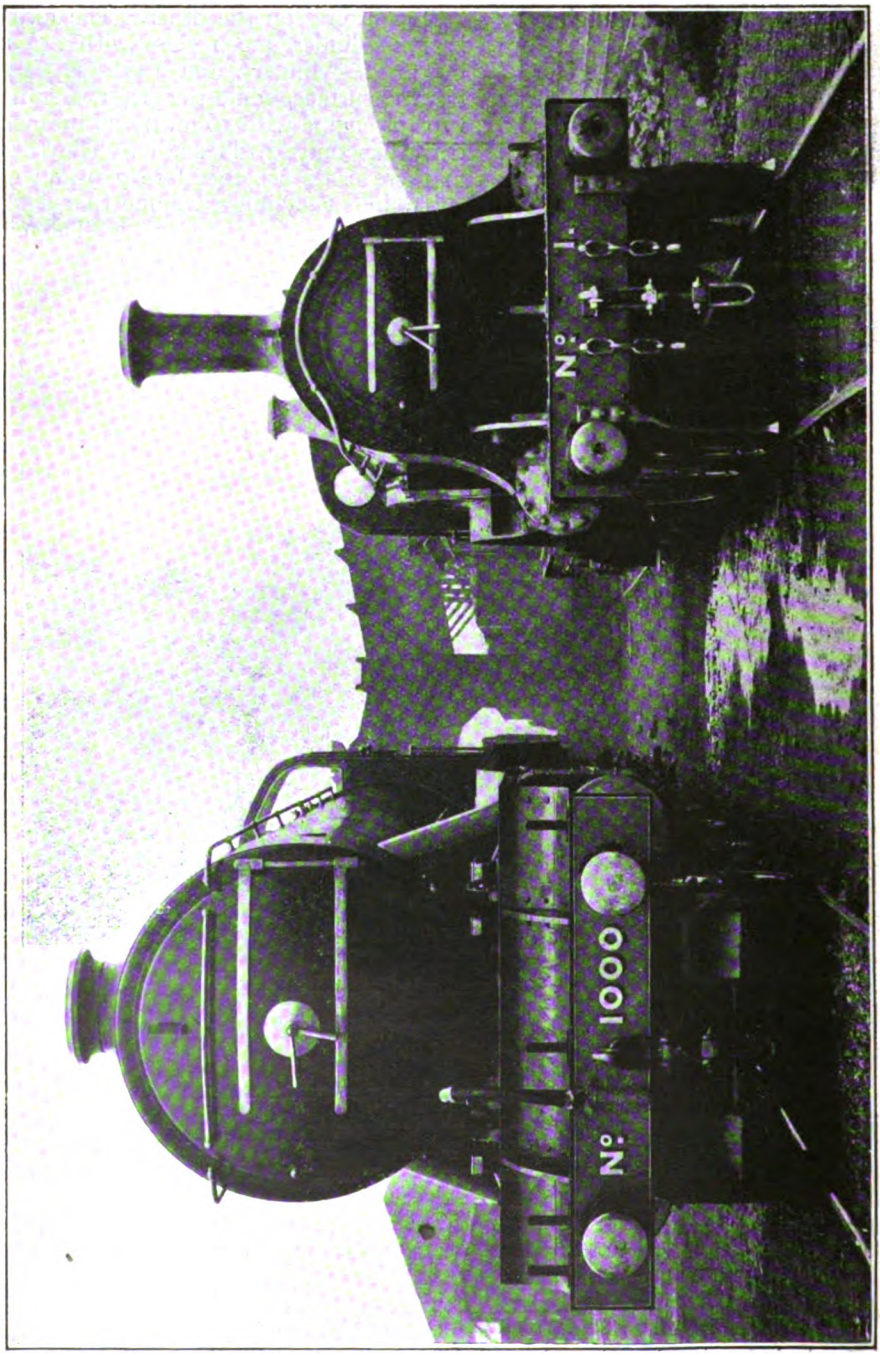


Photo.] LONDON & NORTH WESTERN RAILWAY. [*Chas. S. Lake.*

Down Anglo-Scottish express passing Bletchley. Four-cylinder 4-6-0 engine No. 2174, "E. C. Trench," "Claughton" class.

Digitized by Google



FIFTY YEARS OF LOCOMOTIVE ENGINEERING ON THE GREAT NORTHERN RAILWAY.

No. 1000, Mr. H. N. Gresley's new 2-6-0 Express Goods Engine, alongside No. 1, the first of the late Mr. Patrick Stirling's famous 8-feet single class introduced 1869-1870.

Digitized by Google

of sustained high speed running, even with substantial loads.

Most of those enthusiasts who wish to base exhaustive deductions as to probable performance on the extent of heating surface appear to me to fail to recognise how much the steaming capacity of an engine depends on the character and location of the surfaces, rather than their extent. Heating surface, in the case of a superheater engine, is divided into three constituent parts—firebox, tubes and flues, and superheater. Of these the superheating surface has nothing to do with the actual *production* of the steam and should logically be shown as an independent dimension. It is the total external area of the nests of tubes in which the steam, already generated, is raised to its superheat temperature. Of the other two components, by far the more important is the firebox heating surface, as here, separated only by the walls of the firebox, the water is in contact with the fire itself; it is round the firebox, therefore, that the major part of the steam is produced. The boiler heating surface consists of the external area of the fire-tubes, and also of the large flue-tubes containing the superheater elements; but an increase in length of a locomotive boiler simply means that a larger proportion of the calorific value of the fuel is utilised in the tubes before the hot gases are finally thrown out of the chimney, without an increase in the production of steam in any way commensurate with the increased heating surface thus obtained.

In this way the total extent of heating surface is a very unsafe guide to steaming capacity and consequent performance. It is possible so to crowd a boiler with tubes of small diameter—this has actually occurred in the past—that, despite a large nominal heating surface, the engines concerned have actually been worse steamers than contemporary types of apparently inferior equipment in this respect. Conversely, many existing types could be named—the Great Eastern Railway "1500" class of 4–6–0 engines is a case in point—in which, owing to restrictions imposed for permanent way reasons on total weight, it has been found necessary to mate a boiler of limited size to the large cylinders necessary for tractive purposes; but this difficulty has been overcome by the provision of a large and well-designed firebox, so that the engines in question steam with an ease quite disproportionate to what might be expected from a consideration of total heating surface alone.

Apart from these considerations, my correspondent makes no allowance for the fact that the particular work for which an engine is designed demands that its chief dimensions shall be proportioned accordingly. For instance, he mentions as an extreme case the 3-cylinder 4–8–0 tank engines of the North Eastern Railway. Recent references in more than one railway journal to the work of these engines were rather misleading, as in point of fact they were not designed for continuous steaming with heavy mineral trains, but for working trains over the "humps" in gravity marshalling yards and more especially the large Erimus yard at Newport, Middlesbrough. This is a class of work requiring a very high tractive effort for short periods and at low speeds only; consequently large cylinders in conjunction with a boiler of limited size, on whose steam production there is at no time any prolonged drain, are in this case practical, and the engines in question perform their special duties efficiently. By way of contrast, the large 3-cylinder 4–6–2 mineral tank engines of the same company, intended for continuous running, are provided with 5 ft. 6 in. diam. boilers and yet their three cylinders are only 16½ in. diam. by 26 in. stroke.

Locomotives designed for working express trains over steeply graded switchback roads, where high downhill speeds are prohibitive, or services with many intermediate stops, require a larger ratio of cylinder volume to effective heating surface than those intended to maintain a high average speed over long stretches of line of medium grading. Ample cylinder volume in such cases enables the engines to tackle short and steep inclines smartly, or to accelerate rapidly from stops, whereas the same engines might have difficulty in working express trains at high average speeds over a level track, owing to the heavy continuous demands the large cylinders would thus make on a boiler of limited steaming capacity. Thus we find, generally speaking, a high ratio of cylinder volume to heating surface in the case of express

Digitized by Google

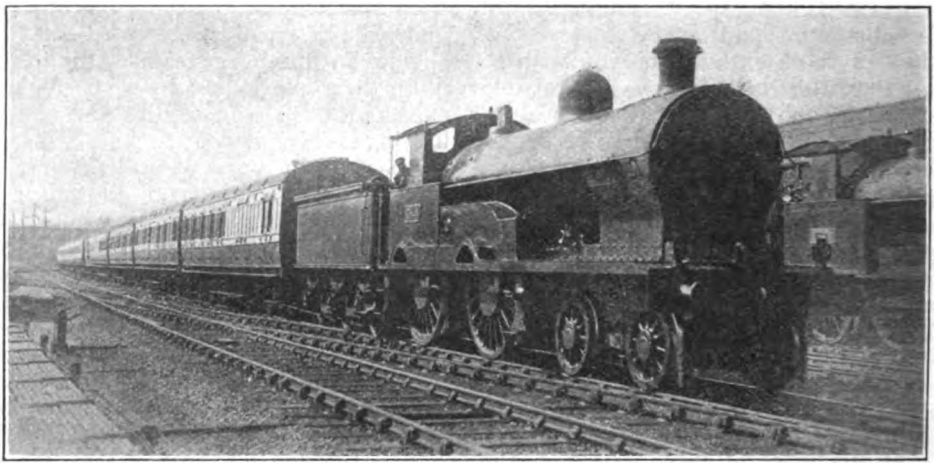


Photo.] LONDON & NORTH WESTERN RAILWAY. [*J. Macartney Robbins.*

Holyhead–Euston express leaving Willesden Junction. 4-4-0 engine, No. 2428, "Lord Stalbridge," "George the Fifth" class.

engines on lines such as the Great Eastern, Lancashire and Yorkshire, Highland and other railways, whereas the exact opposite is manifest on, say, the Great Western and Great Northern Railways. For the latter companies need locomotives capable of continuous steaming at high speeds over well-graded roads, and so furnish their engines with cylinders of moderate volume, but boilers of ample steaming capacity. Tank engines for suburban service are as a general rule provided with cylinders somewhat larger in proportion to their steaming capacity than express engines, owing to the necessity for rapid acceleration from frequent stops. Engines for goods and mineral service also require larger cylinders; as in their case maximum tractive capacity is needed at low average speeds. The ideas of individual designers vary, and these cannot be taken as invariable rules, but I think they will be found to sum up constructional practice in this particular fairly accurately.

My correspondent is fairly, though not absolutely, correct in his historical summary. In the closing years of last century there certainly was a tendency apparent among locomotive designers, when they required more tractive power (especially in the case of express engines), simply to enlarge the cylinders of existing types without any other variation of the design. Th led to engines becoming over-cylindered, and correspondingly reduced their efficiency in working; the last batch of Stirling singles, mentioned by my friend, is a case in point. On the other hand, I should certainly hesitate to say that the large-boilered Ivatt 4-4-2's "set the fashion for large boilers and moderate-sized cylinders all over the country"; as regards limited cylinder dimensions they are, and always have been, unique among express engines, but in the matter of boiler dimensions Mr. McIntosh's "Dunalastairs" are generally looked upon as having proved the turning point in the direction of more ample provision for steaming. Still less could I agree that at the present time "we see the boilers getting smaller and the cylinders larger again." Cylinders are certainly growing larger, and so far from "the advent of the superheater" not being able to "account for all of it," I should say that, for reasons more than once dealt with at length in these articles, no other explanation could be offered, apart, of course, from continual demands for enhanced tractive power. I very much doubt, indeed, whether my correspondent could instance any but superheated engines among recently-designed types for ordinary service in which the ratio between cylinder volume and heating surface has been altered from the traditional practice of the company concerned.

Neither is it true to say that boilers

Digitized by Google

are "getting smaller." This is where the writer of the letter falls into the error of failing to distinguish between the dimensions of the boiler and the area of its heating surface. What is really happening in the case of superheated engines is this. By the insertion into the boiler of the large flue tubes containing the superheater elements, a large number of the ordinary fire-tubes are displaced. Even allowing for the addition of the area of the superheating surface, the net result is usually a small loss of total heating surface. From this my correspondent deduces a "smaller boiler," whereas the boiler is no smaller at all, and as a vehicle for producing steam is probably a great deal more efficient. The moral of all this, however, is that the coming of the superheater has made us revise all our preconceived notions of the right relations between boiler and cylinder dimensions. Nothing could have brought this home to me more forcibly than my footplate journeys on the London and South Western Railway, described in the last issue. Here was a class of engine with cylinders no less than 22 in. diameter by 28 in. stroke, and yet, whether it were on the 50 mile run from Waterloo out to Worting, with the regulator wide open continuously and an average cut-off of 35 per cent., or whether it were the terrific 1 in 80 ascent to Honiton Tunnel, breasted on a cut-off rising to 55 per cent., never once was there the remotest suggestion of shortage of steam. Thus, despite these huge cylinders, the engines concerned cannot possibly be regarded as over-cylindered, even when running for long distances at high speed under continuous steam. I believe I am right in saying that it is not possible to obtain the fullest benefits from superheating if the engine be under-cylindered, as, for example, an existing type superheated without any increase of cylinder dimensions. On the other hand, from a close study of the work of superheated engines, I cannot help remarking that I have never yet noted in the performance of any superheated express type the characteristics of over-cylindering. In fact, I am inclined to doubt whether we have yet reached the maximum limit in the relation of the cylinder volume of superheated locomotives to their heating surface. Whether this brief treatise on the subject will stimulate the "healthy discussion" which my correspondent so desires to see initiated, I do not know, but I trust that it may at least satisfy his own thirst for information on the subject.

In turning to performance I recollect that the London and North Western Railway has had but little attention in these columns lately, and so will now devote some space to a number of recent

Photo.] LONDON & NORTH WESTERN RAILWAY. [*Chas. S. Lake.*

Up express passing Bletchley Reservoir. 4-4-0 engine, No. 1138, "William Froude."

Digitized by Google

runs over that system. Truth to tell, it is difficult to conjure up any very great enthusiasm over current London and North Western running, with the trains still so very much decelerated, as compared with pre-war standards of speed, while the trainloads are now down again to much about their pre-war figure. But that, after all, is the case with a number of British lines to-day, now that the vast loads which alone infused any interest into the decelerated timings have become a thing of the past. A number of my runs were on the morning express from Euston to Liverpool and Manchester—the amalgamation of the old 10.30 a.m. and 12.10 p.m. expresses out of Euston—which first left at 11.0 a.m., then was split up for the summer into a Liverpool portion at 11.5 a.m., and a second train for Manchester, Keswick and Windermere at 11.15 a.m., and now has returned to a combined Liverpool and Manchester express at 11.5 a.m. But this is in reality a purely legendary combination, as in point of fact the two portions are still run separately every day at 11.5 and 11.15 a.m.

In the days of the combined 11.0 a.m. train, allowed 3½ hours to Crewe non-stop, No. 1086, *Conway*—a 4-4-0 superheated "George the Fifth"—had to haul a packed train of 15 bogies (people were standing in the corridors throughout), weighing 434 tons empty and not loss than 480 tons full. This was just before the reintroduction of dining cars. We were up Camden Bank and through Willesden, 5.4 miles, in 11 min. 55 sec.; Watford, 17.5 miles, in 28½ min.; and Tring, 31.7 miles, in 46 min. 40 sec., the maintained speed up the long 1 in 330 being 41 m.p.h. The 15 miles from Tring to Bletchley took 14 min. 40 sec., with a maximum of 67 m.p.h., the 5.8 miles on to Wolverton 5 min. 25 sec., and the 7.4 miles thence up to Roade 8¾ min., with a minimum of exactly 40 m.p.h. We were very badly checked for permanent way repairs between Blisworth and Weedon, so that the 22.7 miles from Roade to Rugby, with a painfully cautious approach to the latter station, occupied 33 min. 10 sec. —total 108 min. 40 sec. from London. Between Rugby and Stafford we had four checks — a very severe one by adverse signals approaching Nuneaton (Nuneaton on the North Western shares the evil reputation of Didcot on the Great Western in this respect in my log-books), and two less severe p.w.r. checks near Polesworth and Colwich

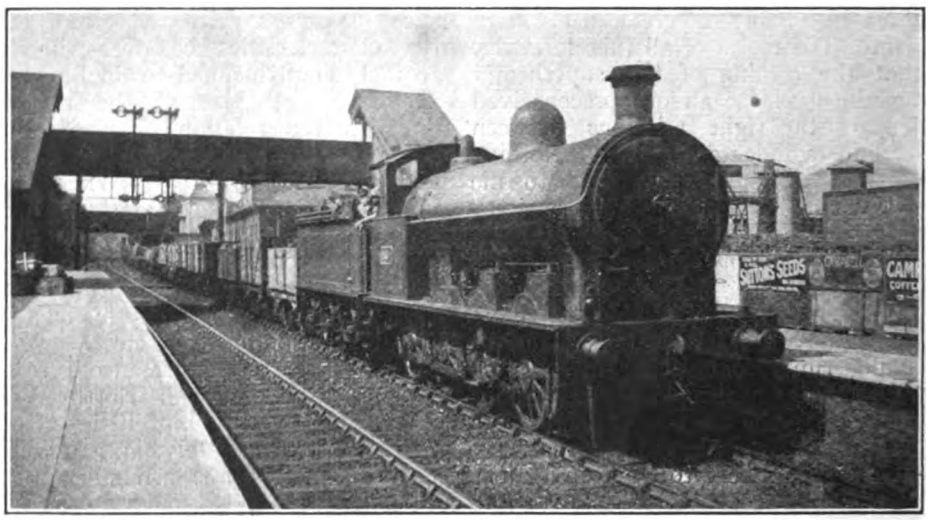


Photo.] LONDON & NORTH WESTERN RAILWAY. [*F. H. Stingemore.*

Up goods train passing Watford Junction. 0-8-0 locomotive, No. 1424.

Digitized by Google

respectively. So the 51 miles from Rugby to Stafford, where we slacked to the painfully conscientious rate of 25 m.p.h., occupied 67½ min.; from there we covered the 14 miles up to Whitmore in 19 min. 5 sec., and then, with very moderate downhill speed, we ran the last 10.5 miles into Crewe in 12 min. 50 sec.—total 208 min. 25 sec. for the 158.1 miles from London. Net time I should put at 197 min., or a modest 13 min. under schedule—not bad work, I suppose, for a 4-4-0 with this load. On another occasion No. 845, *Saddleback*, with a lighter load of 450 tons, completed the journey in 5 sec. under the same gross time, with a 2½ min. stop at Rugby and another bad signal check at Nuneaton.

Next come four runs on the 11.15 a.m. down. In the first two of them, No. 1086, *Conway* was again the engine; No. 89, *John Mayall*, was at the head of the train in the third case, and No. 2081, *New Zealand*, in the fourth. All of these are "George the Fifth" class 4-4-0's. Loads were 54 axles on the first and third runs and 58 on the second and fourth; tare weights were 398, 420, 402, and 425 tons, and gross weights 420, 450, 430, and 450 tons respectively. We were through Willesden in 11 min 10 sec., 12 min., 10 min. 35 sec. (a fine start this, with 430 tons), and 11 min. 50 sec.; and Watford in 26 min. 5 sec., 27 min. 35 sec., 26¾ min. (after a severe p.w.r. check over Bushey troughs in this case), and 25½ min. *New Zealand* did much the best work over the latter length, not falling below 51½ m.p.h. on the 1 in 330 beyond Pinner. To Tring, scheduled to be passed in 44 min., the times were 44 min., 46 min. 10 sec., 44 min. 55 sec., and 43 min. 55 sec.. Tring to Bletchley took 14 min. 55 sec., 14¾ min., 14 min. 5 sec., and 15 min., *John Mayall* leading the way with a sustained maximum speed of 69 m.p.h. Here again, by the way, there are to be found in the London and North Western working time-table times as unpractical as those in the London and South Western book commented on in the last issue; it is difficult to understand how the driver of a heavy train can be expected to maintain a schedule of 17 min. for the 14.2 miles, mostly at 1 in 330, from Watford *up* to Tring, when his allowance for the succeeding 15 miles of corresponding *down* grade is precisely the same. It is contrary to human nature; especially as the

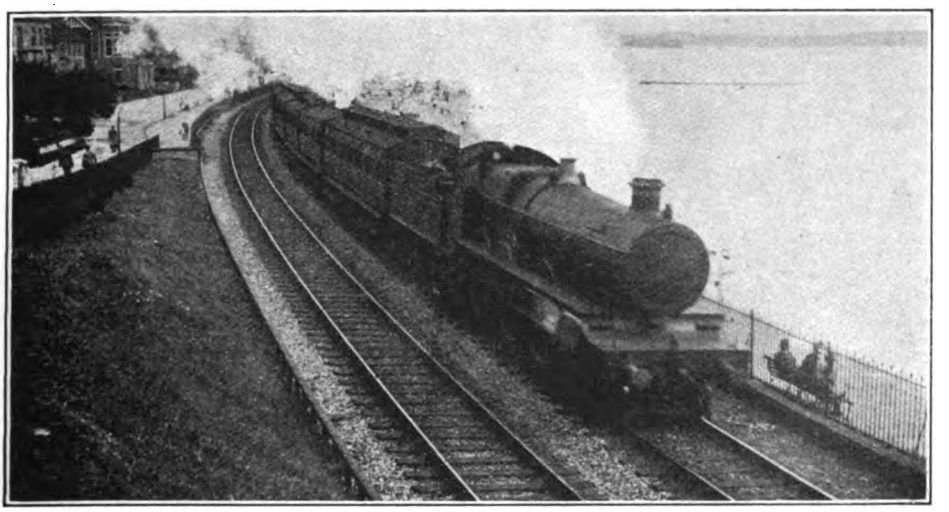


Photo.] GREAT WESTERN RAILWAY. [*F. H. Stingemore.*

Plymouth train approaching Lea Mount Tunnel, Dawlish. Two-cylinder 4-6-0 locomotive, No. 2944, "Highnam Court."

Digitized by Google

London and North Western 60 m.p.h. maximum speed, now removed, admits of a time of 15 min. from Tring to Bletchley.

On the second run we passed Bletchley on time, but on the other three we were 2 min. early in each case. Bletchley to Wolverton took 6 min. 35 sec., 5 min. 40 sec., 5½ min., and 5 min. 55 sec.; and Wolverton up to Roade 8 min. 50, 35, 10, and 40 sec., *John Mayall* carrying off the honours with a minimum rate of exactly 50 m.p.h. Blisworth was passed in 77¼ min., 79 min., 75 min. 55 sec. (74½ net), and 77 min. After this came various checks, the check on the first run, a severe one on the second, and a dead stand for 35 sec. at Attleborough Stone Sidings on the third. So it took 19 min. 25 sec., 21¾ min., 23 min. 55 sec., and 19 min. 25 sec. to pass Nuneaton, 14.5 miles; 34¾ min., 36 min. 10 sec., 38¾ and 33 min. to Tamworth, 27.5 miles; 51¼ min., 52 min. 25 sec., 54 and 50¾ min. to Rugeley, 41.6 miles; and 64 min. 10 sec., 62 min. 55 sec., 65 and 62½ min. to Stafford, 51 miles, booked 65 min. A permanent way check beyond Colwich accounts for the first run falling in arrears. From Stafford up to Whit-

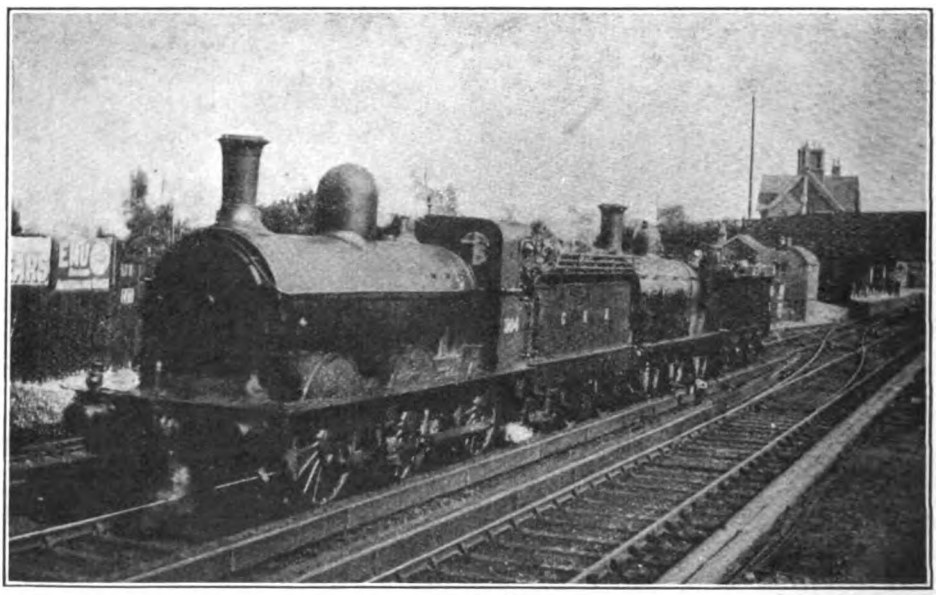


Photo.] LONDON & SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

G.N.R. 0-6-0 engine, No. 304, and L. & S.W.R. 0-6-0, No. 699, near Hounslow.

Weedon caution being responsible for reductions of speed to 30, 50, 30, and 40 m.p.h. (p.w. relaying also was going in the first and third cases); on the second and fourth runs signal checks preceded the usual stop at Rugby to change guards, while *John Mayall* was badly delayed by signals. Times to Rugby were therefore 104¼ min., 103 min., 104 min. 55 sec., and 103 min. 5 sec., or 102¼, 102, 98½, and 101 min. net, against a schedule of 105 min.. After restarting, we found the Nuneaton district maintaining its reputation on all runs but the fourth, getting a slight more occupied 19 min. 25 sec., 18¾ min., 17 min. 10 sec.—*John Mayall* did splendidly here, maintaining 50 m.p.h. until checked by signal when approaching the summit, after which slight signal checks followed all the way to Crewe—and 19 min. 5 sec., while the final length into Crewe, signal checked on the fourth run also, occupied 13 min. 25 sec., 12¾ min., 12 min. 55 sec., and 14¼ min. Total times were therefore 97 min., 94 min. 25 sec., 95 min. 5 sec., and 92 min. 50 sec. from Rugby, 75.5 miles, booked 97 min., or 94, 91¾, 88, and 90¼ min. net. Overall time of

Digitized by Google

145 min. was improved upon by 1½, 4¼, 2½, and 3½ min. respectively, inclusive of all delays, and *John Mayall* did particularly well, gaining 15½ min. in running, which would be equivalent to a non-stop run of about 184 min.

From a correspondent come details of a run on the Liverpool portion of the same train, which is reminiscent of my famous record behind *Wild Duck* in that the train stuck on Camden bank owing to greasy rails, and had to be pushed in rear up to Chalk Farm. *Wolfhound*, No. 1489, another "George," was the engine, with a 56-axle load, weighing 379 tons empty, and 410 tons full. In these circumstances it took 18 min. 20 sec. to get through Willesden, but Watford was passed in 33 min. 5 sec., and Tring in 49½ min., a speed of 50 m.p.h. being maintained up to the summit. Without any higher rate than 65 m.p.h. on the subsequent descent, Bletchley was passed in 64 min. 10 sec., Roade in 78 min. 40 sec., Blisworth in 82 min. 5 sec., and Weedon, 69.7 miles, in 89¼ min., Rugby being reached in 104 min. 25 sec., or about 97 min. net. The stop here lasted nearly 4 min., and from Rugby, *Wolfhound* passed Nuneaton in 19 min. 5 sec., Tamworth in 32 min., and Rugeley in 47 min. 35 sec., but a very bad signal check before Colwich made the time to Stafford 61 min. 50 sec. Stafford up to Whitmore took 16 min. 40 sec., the minimum speed on the ascent being 49 m.p.h., and with no higher subsequent speed than 65½ m.p.h., the Whitmore-Crewe length was run in 12 min. 20 sec., making a total time from Rugby of 90 min. 50 sec., or 87 min. net, and from London of 55 sec. inside the present schedule of 200 min. On the basis of this running a non-stop time of about 186 min. could have been made from London.

In the opposite direction I have had two very fair runs behind "Claughtons." No. 511, *George Macpherson*, with a 50-axle train weighing 366 tons tare and 385 tons full—the 5.20 p.m. from Liverpool to Euston—passed Rugeley, 9.4 miles from Stafford, in 13 min. 35 sec.; Tamworth, 23.5 miles, in 28 min. 5 sec. (with a top speed of 67 m.p.h. at Hademore); Nuneaton, 36.5 miles, in 42 min. 40 sec.; Rugby, 51 miles, in 59 min. 40 sec., at reduced speed; Weedon, 62.9 miles, in 76 min. 40 sec.; Roade, 73.7 miles, in 87½ min.; and Bletchley, 86.9 miles, was reached in 102 min. 10 sec., schedule allowing 106 min. Maximum speeds were 60 m.p.h. beyond Welton and 64½ beyond Roade, while the intervening minimum was 47.4 m.p.h. From Bletchley, Tring summit, 15 miles, was passed in 21 min. 10 sec., at 20½ m.p.h.; from there the 14.2 miles to Watford occupied 14 min., and the 12.1 miles on to Willesden, 11 min. 40 sec., with maxima of 68 m.p.h. in each case. Being now before time, we crawled on into Euston, completing the 46.7 miles from Bletchley in 56 min. 20 sec., instead of the 59 min. allowed. The engine thus gained 6½ min. from Stafford.

The second occasion found me on the 12.5 p.m. from Manchester to London, No. 116 (unnamed) having the substantial load from Stoke of 60 axles, weighing 427 tons empty and 450 tons full. We were stopped by adverse signals at Colwich, with a preliminary slack at Haywood, but without any speed over 64½ m.p.h. on the North Stafford line completed this 18.7 miles in 23 min. 5 sec., start to stop. Restarting, we passed Rugeley, 3.1 miles, in 5 min. 55 sec.; Tamworth, 17 miles, in 20 min. 25 sec.; Nuneaton, 30 miles, in 34 min. 55 sec.; and reached Rugby, 44.5 miles, in 52 min. 25 sec. Net time from Colwich would be 51 min., owing to slight checks before Nuneaton and outside Rugby; net time from Stoke, 63.2 miles, was about 72 min., against 78 min. scheduled. From Rugby we passed Weedon in 17 min. 50 sec., touching 65 m.p.h. beyond Welton; Roade in 28 min. 35 sec., at 47 m.p.h.; and then reached 67 at Castlethorpe and were through Bletchley in 42 min. 5 sec. After that we took things very easily, falling to 39½ m.p.h. at Tring, and taking 18¾ min. from Bletchley to that point; Tring-Watford occupied 15 min. 5 sec. (maximum speed 65 m.p.h.) and Watford-Willesden, with a concluding signal check, 14 min. 40 sec., total 90¾ min. or 89 min. net from Rugby. As the latter schedule is 95 min., the aggregate gains to engine on this journey were 12 min.; the train

Digitized by Google

concerned is, of course, very easily timed.

But I have just received from a correspondent, at the moment of writing, details of a recent "Claughton" run, which far transcends in merit either of the two foregoing trips. The train concerned was the 9.40 a.m. from Liverpool to London, made up to 11 eight-wheelers and 2 twelve-wheeled "diners," 403 tons empty and about 430 tons full; No. 2221, *Sir Francis Dent*, was the engine. Commencing from Rugby, No. 2221 attained 46 m.p.h. up the 1 in 364 to Kilsby Tunnel, and passed Welton, 7·3 miles, in 11 min. 53 sec.; with a subsequent maximum of 72 m.p.h. the 5·6 miles on to Weedon were run in 5 min. 12 sec., and the 6·8 miles thence to Blisworth in 6 min. 27 sec. Up the 2½ miles at 1 in 326 to Roade the minimum rate was 58 m.p.h., the 3 miles from Blisworth taking 3 min. 2 sec.; then the 7·4 miles from Roade to Wolverton were reeled off in 6 min. 38 sec., with a top speed of 75 m.p.h., the subsequent 5·8 miles to Bletchley occupying 5 min. 33 sec.—total 38¾ min. for the 35·9 miles from Rugby. While the train was passing through Bletchley the advance starter at the South Box was suddenly thrown to danger owing to a slight mishap on an adjoining line, and the express was thereby brought to a stop and kept standing for 14½ min. Restarting, No. 2221 passed Leighton, 6·5 miles, in 9¾ min., at 57 m.p.h.; Cheddington, 10·6 miles, in 14 min. 13 sec., at 51 m.p.h.; and then maintained 49 m.p.h. steadily up the 1 in 330 to Tring, passing the summit, 15 miles, in 19 min. 35 sec. On the succeeding descents speed was not allowed to exceed 70 m.p.h., Tring to Watford, 14·2 miles, taking 13 min. 20 sec., Watford to Harrow, 6·1 miles, 5¾ min., and Harrow to Willesden, with a very slow stop, 6 miles, 6 min. 43 sec. This meant a total of 45 min. 23 sec. from Bletchley, 41·1 miles, and 99 min. 43 sec. from Rugby, 77·2 miles, but as 14½ min. of the latter were spent standing at Bletchley, the actual running time was 85¼ min., and the net time somewhere between 80 and 81 min. With a gross load of 430 tons and a schedule of 93 min., this was a remarkable piece of work.

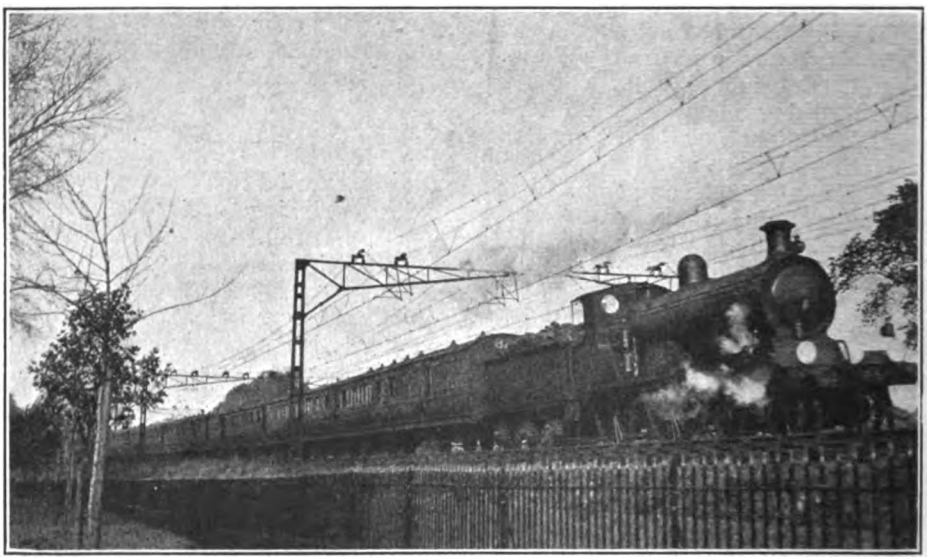


Photo.] LONDON, BRIGHTON & SOUTH COAST RAILWAY. [*J. F. Dearden.*

Victoria–Hastings express near Tooting Common. 4-4-0 engine, No. 65.

During last summer I had an interesting journey on the Chester-Holyhead section, which "featured" one of the simplified Webb compounds of the "Renown" class, No. 1925, *Warrior*. The train concerned was the midnight west-bound non-stop from Chester,

Digitized by Google

running on this occasion in advance of the 8.10 p.m. Irish Mail *ex*-Euston, instead of attached to it, as shown in the working book; load was 41 axles, partly non-corridor, 268 tons empty and 290 tons full. We ran very easily over the first and level part of the journey, taking no less than 24¼ min. to Holywell, 16¾ miles, and 40 min. 25 sec. to Rhyl, 30 miles. On Llandulas bank (2¾ miles at 1 in 412 and ¾ at 1 in 100), we fell to 39½ m.p.h., but touched 62½ at Mochdre, covering the 7⅞ miles from Rhyl up to Llysfaen in 9½ min., and the 6½ miles thence to Llandudno Junction in 7 min. 10 sec. Slacking to 40 m.p.h. over Conway Bridge, we covered the 8⅛ miles from Llandudno Junction to Llanfairfechan in 9 min. 40 sec., and the 7¼ miles on to Bangor in 8 min. 35 sec. We had commenced the 7 mile ascent to Menai Bridge, as steep in parts as 1 in 163, at 59 m.p.h., and entered the bridge itself at 43½ m.p.h.,; the 6¼ miles from Bangor to Gaerwen occupied 8¼ min. We took the dip between Gaerwen and Bodorgan at a high speed, attaining 74 m.p.h. and covering the 6½ miles in 6 min. 25 sec.; we then breasted Bodorgan bank at a minimum of 51½ m.p.h., and touching 62½ at Rhosneigr, ran the 8⅜ miles from Bodorgan to Valley in 9 min. 5 sec. Holyhead should have been reached in 103 or 103½ min. from Chester, as we passed Valley, 80⅞ miles, in 99 min. 5 sec., but a long preliminary signal stop made this impossible. For an engine of such limited power this net gain of 4 min. on the 107 min. schedule was quite respectable.

And now for a few brief records of work north of Preston. On a 36 min. schedule for the 27¼ miles from Preston to Carnforth, with a short adverse strip at 1 in 95 from the dead start, but otherwise fairly level, save for a sharp fall through Lancaster, I made four runs. Nos. 2184 and 940, both unnamed 4-6-0 "Princes," had 50 and 54 axle trains weighing full 340 and 380 tons respectively; No. 374, *Empress*, a non-superheated "Precursor" 4-4-0, hauled a 370 ton 54-axle train; and No. 1103, an unnamed "Claughton," was at the head of a 425-ton express of 56 axles, and had the disadvantage of a signal check immediately after starting. We passed Garstang, 9½ miles, in 14 min. 40, 10, 45, and 5 sec.; Lancaster, 21 miles, in 27 min. 50, 15, and 25 sec., and 26 min. 20 sec.; and Carnforth was reached in 34 min. 50, 25, and 15 sec., and 33¾

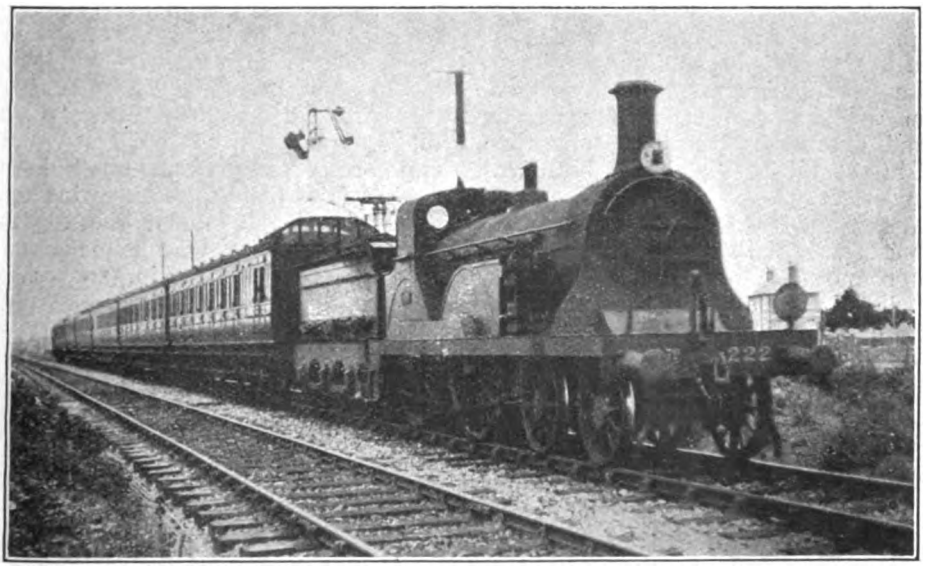


Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*F. W. Curtis.*

Victoria-Margate express passing Westgate-on-Sea. Stirling 4-4-0 locomotive, No. 222.

Digitized by Google

min. respectively. No. 1103's net time would be a shade over 33 min. All the drivers "eased" through Lancaster, and the highest subsequent speed was the 64½ m.p.h. of No. 1103, which also had touched 60 at Brock. On the last of these four runs only I continued to Oxenholme; we attained 31½ m.p.h. with 425 tons on the 1 in 131 from Carnforth, passed Milnthorpe, 7¼ miles, in 11 min. 50 sec., and reached Oxenholme 12⅞ miles, in exactly 21 min.—not at all a bad figure, seeing that the final 6 miles are entirely adverse, from 1 in 182 to 1 in 103.

Coming south I have details of three runs on the 3.55 p.m. *ex*-Carlisle, one of my own timing, and two others from correspondents. In the first a "Claughton" figures, with a 54-axle train weighing 390 tons full; in the second, another engine of the same type, and in the third a "Prince," both with 52 axles, or 380 tons. The three numbers were 260, *W. E. Dorrington*, 2420, and 2184, both unnamed; the third run commences at Penrith. Out of Carlisle, Nos. 260 and 2420 maintained minima of 28 and 30 m.p.h. up the 1 in 132 to Wreay, passing that station, 4⅞ miles, in 11 min. 40 and 48 sec.; Plumpton, 13⅛ miles, was passed in 24¾ min. and 25 min. 1 sec., and Penrith 17⅞ miles, was reached in 31¼ min. and 31 min. 50 sec. Booked time is 30 min., but the full 5 min. station allowance at Penrith is seldom required. The adverse grades continue all the way from Carlisle to Plumpton, but flatten to 1 in 169-229 beyond Wreay. From Penrith the "Prince" figures as the best hill-climber, but unfortunately my friend failed to record the maximum and minimum speeds. The three times for the 13½ miles from Penrith to Shap Summit, the major part of which is inclined at 1 in 125, were 27 min. 20 sec., 26 min. 9 sec., and 24 min. 3 sec.; the sustained speeds of the "Claughtons" on the 1 in 125 were 26½ and 30 m.p.h. respectively. Subsequent downhill work was of little interest, owing to the rigidly restricted speeds; the 18⅝ miles from Summit to Oxenholme occupied 20 min. 20 sec., 21 min. 10 sec., and 18 min. 24 sec.; the 12⅞ miles from

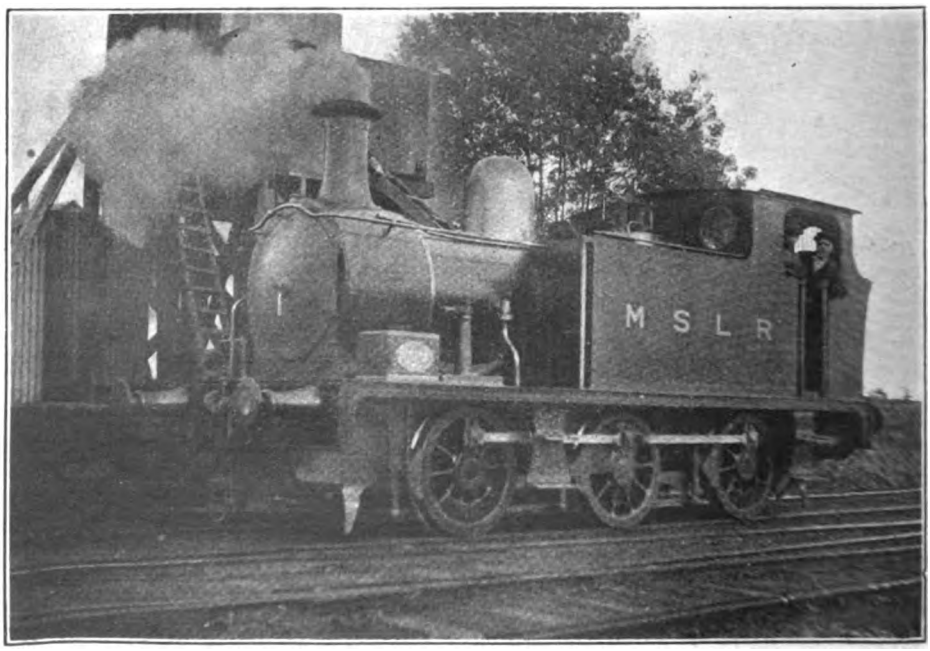


Photo.] MID-SUFFOLK LIGHT RAILWAY. [*K. A. C. R. Nunn.*

0-6-0 tank engine No. 2, taking water at Haughley.

Digitized by Google

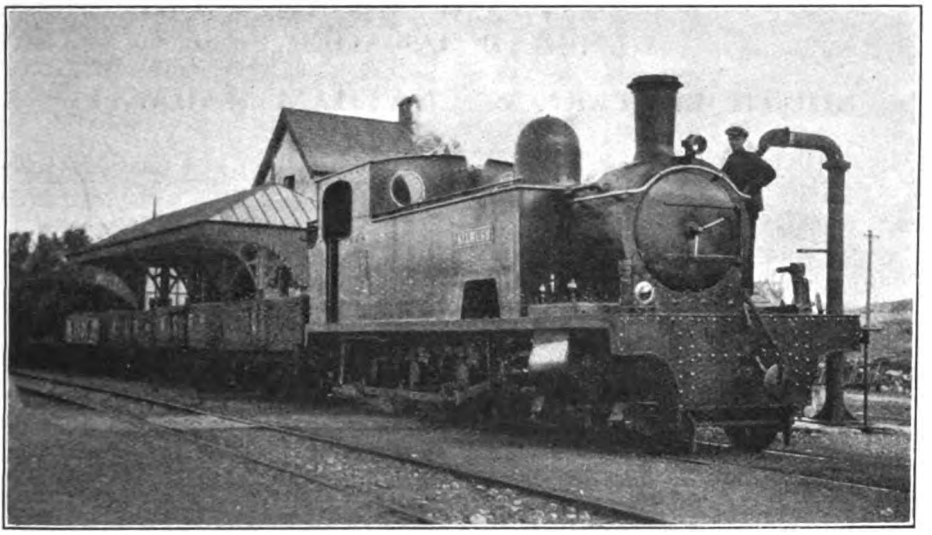


Photo.] WEST CLARE RAILWAY. [*D. B. Bradshaw.*

3 ft. gauge. 4-6-0 tank engine No. 1, "Kilrush," at Ennistymon.

Oxenholme to Carnforth 14 min. 10 sec., 13 min. 42 sec., and 12 min. 16 sec.; and the 6¼ miles thence to Lancaster 7 min. 50 sec. (in the case of my run this was to a dead stop, which had not then been cut out of the schedule of this train) 6 min. 34 sec., and 7 min. No. 260 had gained 80 sec. on the 71 min. schedule from Penrith to Lancaster, 51¼ miles, but No. 2420 had covered the distance in 67 min. 35 sec., and No. 2184 in the splendid time of 61 min. 43 sec., 8¼ min. under that scheduled. Signal checks were experienced on the last run beyond Barton, but even so Preston, 72¼ miles, was reached in 89 min. 40 sec., instead of the 95 min. allowed. No. 2420's time was 94¼ min., while No. 260, banked in rear up the 1 in 95 out of Lancaster, ran the 21 miles to Preston in 28 min. 20 sec., start-to-stop.

An unusual recent experience of mine was one on the 12.30 a.m. out of Carlisle, with a 56-axle train of 405 tons, when we had another "Claughton," No. 1429, *Colonel Lockwood*, piloted up to Shap—and very strange the combination looked—by one of the large 4-6-2 superheater tanks, No. 1021. We passed Wreay in 10 min. 5 sec., Plumpton in 22 min., Penrith in 27 min. 50 sec., and stopped at the Summit, 31⅜ miles, in 49¾ min. A rate of 32 m.p.h. was maintained in the 1 in 125, and probably would have been improved on, but that we were getting before time, 54 min. being allowed to the top. From the Summit, No. 1429 passed Tebay, 5⅝ miles, in 7¾ min., Oxenholme, 18⅝ miles, in 22 min. 5 sec., and reached Carnforth, 31½ miles, in 36 min. 40 sec., having at no point exceeded 60 m.p.h. Our total time from Carlisle was 88 min. 40 sec., instead of the 91 min. allowed. I shall remember this journey for many a long day, in that I was unfortunate enough to occupy the last rear compartment of a lengthy train on a night of icy coldness, but after Carnforth I did at last succeed in falling asleep, and so the remainder of the trip went unrecorded. The runs described, however, are sufficient to demonstrate the need for radical acceleration of the London and North Western express services, and the ability of the locomotives to maintain times greatly curtailed from their present figure.

Digitized by Google

Retirement of Sir Francis Dent,

GENERAL MANAGER,

SOUTH EASTERN & CHATHAM RAILWAY.

A LONDON and North Western Railway man by association and training, Sir Francis Dent came to a field of service differing essentially in almost every possible way when, in April, 1907, he took over the appointment of Chief Goods Manager to the South Eastern and Chatham Railway Managing Committee. In that capacity, however, Sir Francis rendered good service in developing the traffic and working of his department and laid the foundations for the exceptionally high esteem in which he has been held by all ranks of the service.

Photo.] [*Elliott & Fry.*

SIR FRANCIS H. DENT,

General Manager,
South Eastern & Chatham Railway, 1911–20.

Digitized by Google

On the retirement of Mr. Vincent W. Hill at the end of March, 1911, Sir Francis Dent became General Manager, a position which he has since held during the nine years which have now elapsed with a degree of success and service harmony which entitles him to be regarded as an exceptionally capable chief executive officer. These years have included the stressful period of the war, and besides his valuable advice and work as a member of the Railway Executive Committee Sir Francis rendered special service in connection with the removal of refugees from Belgium to England during the dark days of the early war years, and recruiting of railwaymen for service on French and Belgian railways. During the war period Sir Francis Dent's wide experience of goods traffic working was, no doubt, a considerable factor whereby the enormous and complex goods and munitions traffic with which the South Eastern and Chatham Railway had to cope, was handled so successfully, notwithstanding that it is essentially a passenger system, and was not thereby so favourably equipped for an exceptional burden of goods traffic.

Royal recognition of the special services which he had rendered was shown when His Majesty the King conferred the dignity of knighthood in the New Year Honours of January 1, 1916. Previously, in 1915, the French Government had created him an Officer de la Légion d' Honneur. Sir Francis Dent is a member of the Advisory Committee on railway subjects at the London School of Economics, a member of the Court of Governors of the Institution, and a member of Council of the newly-formed Institute of Transport. He was chairman for 1909 of the Goods Managers' Conference of the Railway Clearing House, while for 1918 he was chairman of the General Managers' Conference.

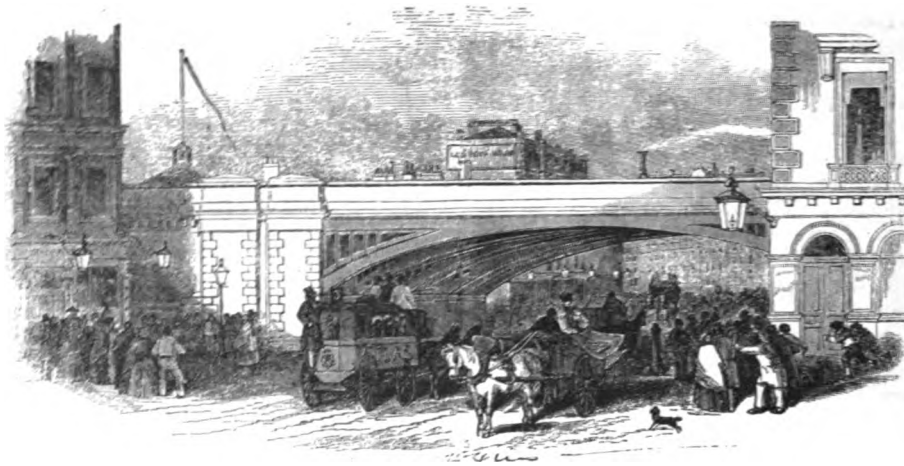
Sir Francis Dent is the second son of the late Admiral Dent, for many years Marine Superintendent of the London and North Western Railway, and entered the service of that company in 1884, being employed in the General Manager's Department until 1886, when he was transferred to the office of the Superintendent of the Line. Three years later he was appointed an Outdoor Assistant to the Superintendent, and in 1893 became Assistant Superintendent for the Chester and Holyhead division. In May, 1899, he became Superintendent of the same district, and in October, 1901, took over the charge of the District Goods Manager's Department in addition.

It was, however, when he came to London in March, 1902, as Goods Traffic Superintendent for the London district, with headquarters at Broad Street station, that Sir Francis Dent came prominently to the fore. It had been proposed to enlarge the premises and increase accommodation, necessarily a most expensive matter in the heart of London; but Sir Francis Dent introduced arrangements, including a bonus system, which produced such results that the scheme for enlargement has long since been abandoned. In this connection we may trace the great personal influence and tact in dealing with men which have proved so valuable in later years, and which constitute one of his most important attributes,

During his tenure of office on the South Eastern & Chatham Railway many improvements have been carried out or completed, not the least being the new marine station at Dover, and the extension of Pullman car facilities on various routes. Indeed, these years have witnessed train service developments of a notable character, and the fact that even after five years of retrograde traffic the South Eastern and Chatham Railway could introduce last summer express train services distinctly superior to the greatly improved facilities of the summers of 1913 and 1914, indicates the progressive policy which has applied, notwithstanding its arrest during the war period, under the direction of Sir Francis Dent.

Mr. P. C. Tempest, Chief Engineer, South Eastern & Chatham Railway, has been appointed General Manager, and Engineer, as stated on another page.

Digitized by Google



BRIDGE CARRYING THE EXTENSION ACROSS WESTMINSTER BRIDGE ROAD
(From an old print.)

How the London and South Western Railway Reached Waterloo.

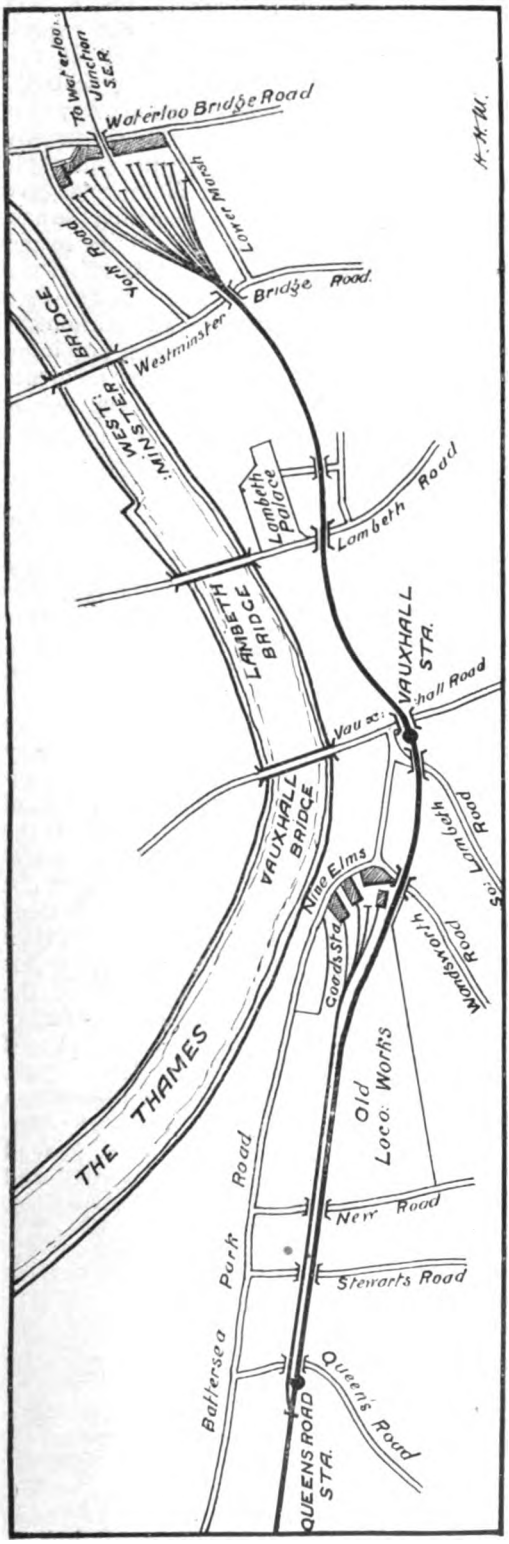
By H. H. MEIK.

THE original London terminus of the London and South Western Railway, when first opened to Southampton, May 11th, 1840, was at Nine Elms, Vauxhall. An illustration of the original terminus, which lay open to the river on the other side of Nine Elms Road, was reproduced in THE RAILWAY MAGAZINE for June, 1911 (Vol. XXVIII, p. 450).

This station, having been found to be inconvenient for travellers on account of the distance from the centre of London, the Vauxhall district being at that time only a suburb, and to other than foot passengers, only approachable by omnibus, steamboat or cab, it was decided by the company to extend the line further eastward towards the centre of London, and accordingly an Act was obtained in 1845 (8 and 9 Vict. c. 185) authorising the extension to the present site of Waterloo Station upon Waterloo Bridge Road. Some doubt exists as to the exact point where the extension left the original main line, but it would appear that this occurred 9 chains to the west of Queen's Road Station, and 1 mile 29 chains from Nine Elms Goods Station. The extension line, which is 2 miles 63 chains in length, was laid out by Mr. Locke, M.P., engineer in chief, along with Mr. Tite, F.R.S., the architect to the company, who was responsible for the building designs. The Waterloo terminus was then vacant ground, and was occupied to some extent by hay stalls, cow yards, dung and similar nuisances. "The station area was laid out so as to eventually comprise 11 acres, and the principal façade and entrances in York Road presented a frontage of 60 ft. in length."

The extension line, after leaving the original main line, crossed over Queen's Road, Stewart's Road and New Road, and then passed by the erstwhile locomotive works on the north, and crossed Wandsworth Road by an iron bridge having a span of 60 ft. Next came the bridges across South Lambeth Road and Vauxhall Road, the latter being crossed by an iron bridge of 50 ft. span; Lambeth Road and the road leading to Lambeth Palace were also spanned by bridges, the latter much on the skew with the novelty of a pier in the middle of the roadway. Just before entering Waterloo the line crossed the Westminster

Digitized by Google



PLAN SHOWING EXTENSION FROM NINE ELMS TO WATERLOO.

Note.—The diagrams of Nine Elms goods and Waterloo passenger stations do not represent them as they were in 1848, and are shown only for indicative purposes.

Bridge Road by an oblique iron bridge of 90 ft. span.*

In regard to Waterloo Station as first designed, *The Illustrated London News* of October 3, 1846, stated that "There will be a magnificent station at Hungerford Bridge.† The extent of the erection may be inferred from the fact that its cost will exceed £100,000. The expenses of constructing the extension line from Nine Elms to Hungerford Bridge, including the purchase of property, will not, it is supposed, be under £600,000, making, with the station, £700,000, or the enormous sum of £350,000 per mile."

"The South Western Railway though making their principal terminus at Hungerford Bridge, do not mean to stop, but are to extend their line to London Bridge, where means will be adopted to connect their station with that of the London and Brighton, the South Eastern, and the various other companies which have their termini on the south side of London Bridge. It is calculated that the expense of extending the South Western Railway from Hungerford Bridge to London Bridge will be about £400,000."

Parliamentary powers were obtained in 1849 for the extension to London Bridge, and a considerable amount of property acquired, but the scheme was never carried out, although a single line was constructed for special through traffic between Waterloo Station and Waterloo Junction (South Eastern Railway). This connecting line has, however, been removed during the reconstruction of Waterloo Station, now nearing completion.

---

* This description refers to the bridges as they existed in 1848, when the extension was completed.

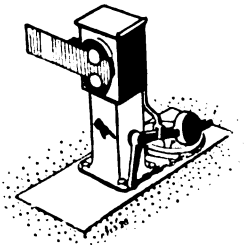
† This suspension bridge was afterwards transferred to Clifton, and the site occupied by Charing Cross Railway Bridge (South Eastern and Chatham Railway).

Digitized by Google

The station, as originally erected in 1848 was a temporary one, with the exception of the iron roof, though later completed as a permanent building. The contractors for the extension line and the station were Messrs. Lee & Son, builders, of Chiswell Street.

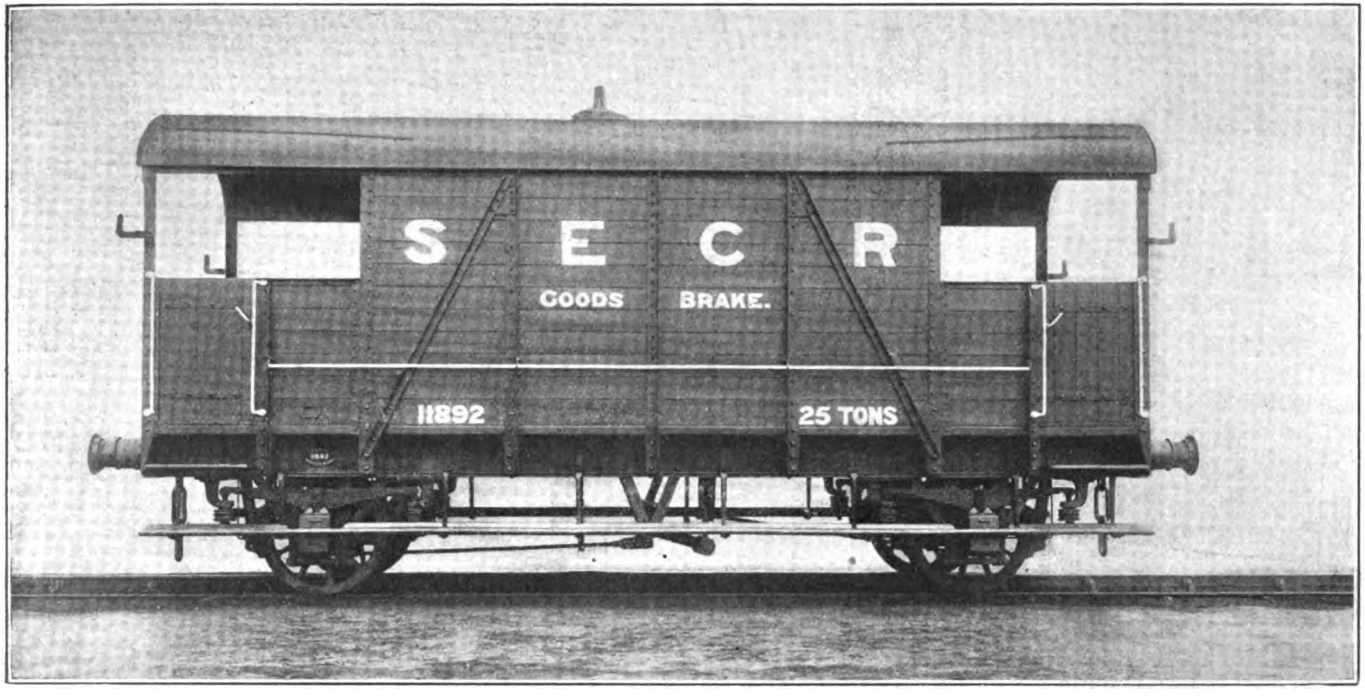
When the extension line was completed the Government Inspector (Captain Laffan) refused his certificate for the opening of the line until the security of the iron girder bridge over Westminster Bridge Road was proved. Friday, September 19, was accordingly fixed for making the experiments; 6 o'clock a.m. was chosen in order that the general traffic should be impeded as little as possible. At that hour Captain Simmons, the Government Inspector-General of Railways; Mr. Ker, Assistant Engineer of the London and South Western Railway; Mr. Gooch, Locomotive Engineer; Mr. Carline, the Company's Inspector, and the agent for Lee & Son, met together to ascertain with a degree of certainty the effect of a quick passage of heavy bodies across the immense span. According to the method then used a number of strong rods secured on a firm foundation were placed upright in the centre of the arch and midway between the centre and sides, and touching the iron girders. In each of these rods was a groove with a sliding shaft which, on the passage of trains, indicated to a hair's breadth the deflection of each girder, and in no instance was it more than three-sixteenths of an inch, thus proving to the satisfaction of the Inspector-General and the scientific gentlemen present that the bridge was as perfect as human ingenuity could make it. Three of the heaviest engines of the company were selected to make the experiment, and closely coupled and otherwise were worked in such a manner as would occur under ordinary circumstances. The Inspector-General was understood to express his perfect satisfaction at the result of the experiments. The four distinct lines of rail were afterwards run over repeatedly with the different engines, and in every case the points or switches, which were mostly self-acting, proved to be in admirable working order. Captain Simmonds gave the necessary certificate for opening the new line, and trains commenced running to and from Waterloo on Tuesday, July 11, 1848.

On Sunday evening, April 13, 1856, a fire broke out at Vauxhall Station at 8.15 p.m. in a small ante-room adjoining the booking office. In a very few moments the fire had extended over the whole station, and the officials were compelled to beat a hasty retreat. The rapidity of the fire was such that it prevented the station staff from signalling trains to stop outside. The traffic manager at Nine Elms happened to be on the spot when the fire occurred, and down trains from Waterloo were all stopped, while up trains were turned off into Nine Elms Goods Station. Vauxhall Station being built of wood the fire continued to extend and attacked the houses on the south side of the property By 11 o'clock the timber roof gave way and fell with a great crash, and by midnight the danger of further extension of mischief was over. At that period the whole of the station, booking offices, warehouses, &c., were reduced to ruins, not even the wooden wall remaining. No one was injured and the mail-bags were taken to Nine Elms, from which place they left in sufficient time to be delivered in the country at the usual hour on Monday morning. Great inconvenience was caused at Waterloo by the fire. Every cab, omnibus and other vehicle in the station and in the adjacent streets were commandeered, and the public-houses, instead of being overcrowded were deserted, and business for a time was totally suspended.



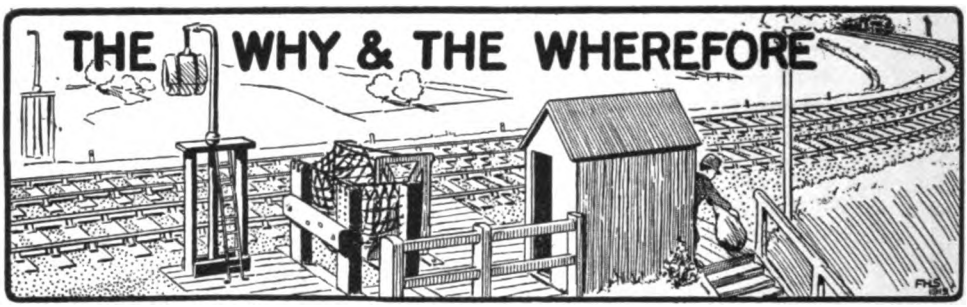
Digitized by Google

25-TON GOODS BRAKE VAN: SOUTH EASTERN & CHATHAM RAILWAY.



By the courtesy of Mr. R. E. L. Maunsell, Chief Mechanical Engineer, South Eastern and Chatham Railway, we are privileged to publish on this page a general view showing one of the new 25-ton goods brake vans, which have recently been built. We understand that a number of these heavy vehicles will shortly be put in service to replace vans of a lighter type. Wheels are 4 ft. 6 in. diam., wheelbase, 16 ft., and tare 25 tons.

Digitized by Google



Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-third annual edition of which, will be published in April, 1920, Price 5s., By post 5s. 6d. Abroad 5s. 8d.*

Great Western Railway Engine, No. 3297, "Earl Cawdor."

Your letter has been submitted to Mr. E. L. Ahrons, the author of the book entitled "The Development of British Locomotive Design," and he has furnished the following information :—

"Great Western Railway, No. 3297, *Earl Cawdor*, was built at Swindon in 1898 as one of the Badminton class, which had Belpaire raised fire-boxes and large domes. Some years afterwards it was rebuilt with the boiler to which your correspondent refers. This was one of the flush deep firebox pattern, the firebox having an ordinary round top. The boiler was also provided with a somewhat small dome, the size of which was probably settled by the high pitch of the boiler. A cab of the American type similar to those introduced by Mr. T. W. Worsdell on the North Eastern Railway was also added. The boiler was 5 ft. 3⅝ in. diam. inside, and had 359 1⅝ in. tubes. The heating surface was: tubes, 1,803¼ sq. ft.; firebox, 130¾ sq. ft.; total, 1,934 sq. ft. The grate area was 17¾ sq. ft. I do not know of any similar boiler on a passenger engine of the Great Western, and probably this was used experimentally. The number of the *Earl Cawdor* is now 4105, but I have not seen it for some years and do not know whether the boiler has since been changed for one of the usual standard Great Western Railway type."

Duplicate Locomotives.

When a locomotive is replaced in the capital accounts of a railway company by a new engine (known technically as a "renewal"), so that its initial cost no longer figures, it is placed by the majority of railways on the duplicate list, such work as it may subsequently perform being regarded as more or less on a supernumerary basis. As a rule, duplicate locomotives receive no further heavy repairs, and when they are no longer able to work, without repair, find their way into the scrap-yard; but it is by no means unusual for them to remain in service for several years. On the London and North Western Railway duplicate engines are numbered from 3,000 upwards, and on the Caledonian from 1,000 upwards; the Great Eastern adds a prefix "O" to the original number and the Midland a suffix "A"; on the London and South Western the old number is underlined; and on various other railways a special series of numbers is reserved for duplicate locomotives.

[Reply to H. A. WHITE.]

West London Railway.

Jointly owned by the Great Western and the London and North Western companies, the West London Railway commences at West London (North Pole) Junction, 11 chains north of St. Quintin Park Station, and runs from there southward to West London Extension Junction, 34 chains south of Addison Road

Digitized by Google

Station. The West London Extension Railway is owned by the two companies mentioned above and also the London and South Western and London, Brighton and South Coast Railways, and, commencing at the junction last named, runs on across the Thames to junctions with the London and South Western and London, Brighton and South Coast Railways at Clapham Junction, and with the same two lines and the South Eastern and Chatham Railway at Longhedge. The West London lines were designed to serve as a link between the railways north and south of the Thames. See also Mr. W. J. Scott's article commenced in this issue.

[Reply to J. C. SEARLS.]

Locomotive Histories.

The reply to "DERBY" and P. E. WALKER given under this heading included, as was definitely stated, the only books known to us dealing exclusively with the locomotives of any one company. By inference, therefore, it follows that such works are *not* available concerning the engines of railways not specifically stated. We may mention that "Behind the Highland Engines," was published in 1913 by R. Carruthers and Sons, at the "Courier" Office, Inverness, price 4d.; while the pamphlet on "The Locomotives of the Railways of the Isle of Wight," which includes those of the Isle of Wight Railway as well as engines of the Isle of Wight Central Railway, is sold by J. H. Fellows, Finsbury Pavement House, London, E.C.2., price 1s. 1½d., post free.

[Reply to T. H. WARDLE, and others.]

Caledonian Railway Locomotives.

For some time the 938-943 series of 4-6-0 engines worked on express passenger service after their transfer from the Highland Railway, and, we understand, performed these duties satisfactorily, but they are at work now principally on express goods trains. The large 4-6-2 tank engines saw some passenger service on the Clyde Coast services from Glasgow, and also on the Edinburgh-Glasgow trains, but the majority of them have now, we believe, been concentrated at Beattock in order to assist down trains up the famous incline. The London and North Western Company has similarly stationed a number of its 4-6-2 tanks at Tebay for banking on Shap incline.

[Reply to ALEXANDER W. ANDERSON.]

The "Pull" of a Locomotive.

So many factors, other than steam pressure and fuel consumption, influence locomotive performance, that it is difficult to give a direct answer to your question. Normally, a locomotive always does run under constant steam pressure, *i.e.*, its working pressure, to which the safety valves are adjusted; fuel consumption varies mainly in accordance with the grading of the line. As a general axiom, you may take it that the pull on the drawbar is greatest at the moment of starting, owing to the necessity for overcoming the static friction of the axles in the journals; that it diminishes as the rate of acceleration becomes less; and that it reaches the lowest figure when the train is running at speed.

[Reply to C.S.L.R.]

Bournemouth-Birkenhead Expresses.

Several correspondents write to inform us that since January 1 an alteration has been made in the working of this train, the London and South Western Railway having resumed the through running with its own engines to and from Oxford. Further, the rolling-stock in one direction daily is now furnished by the Great Western Company, except the restaurant car, which is still of London and South Western type on both trains. The combination of a restaurant car owned and worked by one company with a train belonging to another company, as in the case of one of these two trains, is, we should imagine, unique.

[Further reply to P. E. WALKER.]

Midland Railway History.

Commenting upon Mr. Ahrons' note given in reply to a query answered last month under this heading, an old reader and occasional contributor mentions that although he has never seen Norton Junction mentioned in a Midland timetable, and has always understood that their trains did not call, still on one occasion, in 1909, he travelled by an Ashchurch-Worcester stopping train when Worcester tickets were collected at Norton Junction instead of Wadborough, and he was thereby enabled to change to a Great Western train for Honeybourne and make a connection which

Digitized by Google

would have been impossible at Worcester.

[Further reply to "CHELTONIAN."]

Girvan, Glasgow and South Western Railway

Your query is not very clear, but the following information, for which we are indebted to Mr. D. Cooper, General Manager, Glasgow and South Western Railway, will probably meet your requirements: "Trains running between Glasgow and Stranraer pass direct through Girvan passenger station, the only one at Girvan, except the goods depot, which is on a branch off the main line. The railway between Dumfries and Stranraer belongs to this company up to Castle-Douglas, where it joins the P.P. and W. joint line, of which the Glasgow and South Western Railway is one of the joint owners, thence to Stranraer."

[Reply to H. FORDE.]

The Severn Tunnel.

Work was commenced in 1873, and took 13 years to complete. The tunnel was finished in 1886. The first train passed through on January 9 of that year. This was a train load of coal from Aberdare on its way to fill a ship at Southampton. No passenger train went through the Severn Tunnel, as part of a regular system of such traffic, until December 1, 1886, when the passenger service was inaugrated. The length of the Tunnel, as stated in the RAILWAY YEAR BOOK, is 4 miles, 624 yards. Of this, no less than 2¼ miles are actually below the bed of the river.

[Reply to AMOS GRANT.]

The "Director" Class 4-4-0's, Great Central Railway.

As a special case, and not as a precedent, we give the leading dimensions of these famous engines: Cylinders, 20 in. by 26 in.; driving wheels, 6 ft. 9 in. diam.; heating surface, firebox, 157, tubes, 1,502, superheater, 210, total, 1,869 sq. ft.; grate area, 26 sq. ft.; working pressure, 180 lb. per sq. in.; adhesion weight, 39 tons 12 cwt.; engine weight in working order, 61 tons; tender weight (with 4,000 gall. of water and 6 tons of coal), 48 tons 6 cwt.

[Reply to T. C. ADKINS.]

Euston-Manchester, via Stoke, London and North Western Railway.

Following are the expresses travelling between Euston and Manchester, *via* Stoke and Macclesfield: 5.30 p.m. *ex*-Euston, due Manchester 10 p.m.; 12.5 and 8.30 a.m. and 12.5 p.m. *ex*-London Road, due Euston 5.45 a.m., 1.5 and 4.35 p.m. These trains join or leave the London and North Western main line at Colwich. You can obtain all information of this character from the London and North Western time-tables or "Bradshaw's Guide."

[Reply to M. L. C. BALFOUR.]

Great Western — London and North Western Locomotive Exchange.

We do not know why the Great Western Railway engine was not tried on the London and North Western Railway north of Crewe. It must be remembered, however, that the acquisition of data relative to fuel and water consumption was the principal object of the trials, rather than a test of tractive capacity, and the data required could probably be obtained more conveniently on the route selected.

[Reply to E. LITTLE.]

Taking Water.

If it is taking water from track-troughs to which you refer, this is done by letting down a movable scoop under the tender, which cuts off the "top layer" of the water in the trough as the engine passes over it. On lines such as the London and South Western Railway, which have no troughs, water must of course be always taken from water columns in the usual way. It would be impossible to answer your other question.

[Reply to C.P.R.]

4-6-0 Engines, London and South Western Railway.

We believe that a number of the various 4-6-0 types are at present in the shops for heavy repairs. Except the new "736" series, the other 4-6-0 engines now work almost exclusively on heavy goods service between Southampton, Salisbury and Exeter; Southampton, Basingstoke, Oxford and Banbury; and Southampton and Nine Elms. Your other query transgresses the rules.

[Reply to "SURBITONIAN."]

"1000" Class: Midland Railway.

These engines have been many times illustrated in the RAILWAY MAGAZINE both in colours and in half-tone; but none of the colour plates nor issues containing the earlier descriptions are now

Digitized by Google

in print. In regard to more recent numbers, we may mention that of April, 1914, in which, in connection with a detailed description of Derby locomotive works, these and other standard engines were illustrated and described.

[Reply to T. H. WARDLE.]

"The Great Bear," Great Western Railway.

A coloured plate, dimensioned line drawing, and full description of this famous engine appeared in the January RAILWAY MAGAZINE. We have on several occasions stated that, as the engine in question takes ordinary turns of duty between London and Bristol, it is impossible to say on what particular train it is likely to be found on any given day.

[Reply to "GREAT BEAR."]

Unusual Piloting, L.B. & S.C.R.

The 0-4-2 tank engine you noted piloting a 4-4-0 express locomotive may have been attached at an intermediate station at which the train called a few miles down the line in order to work it up to Croydon, instead of running "light." Or the train engine may have failed in some respect so that assistance was given over the more difficult part of the route.

[Reply to "DERBY."]

Purley-Earlswood Avoiding Line, London Brighton and South Coast Railway.

Seeing that this line was opened on April 1, 1900, it could hardly be described as "new." It has been referred to in detail in several issues of the RAILWAY MAGAZINE between that date and this, although no article has been published dealing exclusively with this section.

[Reply to FRANK WRIGHT.]

Midland Railway Locomotives.

We are obliged for your note that No. 317 of the early Johnson 4-4-0 series Nos. 300-327 was seen by you recently at Ilkeston, and in view of the interest you are taking we pass on your query as to where No. 319 is now working; but it must be pointed out that queries of this kind are excepted by the rules which appear at the head of this section.

[Reply to A. E. WOOD.]

Crewe-Northwich-Liverpool Service, London and North Western Railway.

Trains from Crewe to Liverpool *via* Sandbach, Northwich and Acton Bridge, require to reverse at Northwich. The 6.20 a.m. *ex*--Crewe arrives Northwich 6.55 a.m., departs 7.20. a.m.; arrives Acton Bridge 7.33 a.m., and departs 7.52 a.m.; and reaches Lime Street at 9.7 a.m.

[Reply to H. A. WHITE.]

11.55 p.m. Exeter-London, Great Western Railway.

This train runs from Taunton *via* Castle Cary to Westbury, and thence by the old Weymouth line *via* Trowbridge to Thingley Junction, Chippenham, whence the Bath main line is followed to London. The stops at Taunton and Swindon, but not at Bristol, are thus accounted for.

[Reply to "GREAT WESTERN."]

Setting back at London Bridge, South Eastern and Chatham Railway.

It is probably because setting back any distance when starting, especially in the case of a lengthy train, would result in the fouling of electrical signalling contacts or catch-points that the warning notice to drivers, to which you refer, has been issued.

[Reply to FRANK WRIGHT.]

Fareham Tunnel.

The loop you refer to was laid in to avoid the tunnel which, although originally constructed for a double track, is now, owing to defects, only sufficiently large to accommodate a single track. The tunnel has certainly not fallen in, but accommodates the Meon Valley line, running between Alton and Fareham.

[Reply to R. S. JOHN.]

Brake Leakages.

A common fault with continuous brakes is that of "leaking on," owing to minor defects. If this is not serious the driver can generally prevent loss of speed by lifting his brakes as frequently as may be necessary; it is but rarely that the leakage is so serious as to stop the train, as in your case.

[Reply to "B'TON."]

New 2-8-0 Locomotives, Great Western Railway.

The engine to which you refer is one of the large number of 2-8-0 R.O.D. engines of the Great Central Railway

Digitized by Google

type taken over by the Great Western and other railways since the termination of the war, and said to number in all 235.

[Reply to R. H. ROWE.]

Pre-war Train Speeds.

We are unable to offer any observations on the coming summer time-tables of the various railways, which at the time of writing have not, in the bulk of cases, been settled by the companies themselves. But it is highly improbable that pre-war speeds, or anything like them, will obtain on the great majority of lines either this summer or a number of summers to come. Indeed, it is probable that some of the best known crack schedules will not re-appear at all.

[Reply to G. E. H. ROBERTS-HAY-BOYD, "PADSTOWNIAN," AND OTHERS.]

Great Western and London and North Western Lines at Shrewsbury.

Joint ownership by these two companies of the General Station at Shrewsbury and the lines thence to Wellington, Buttington, and Hereford, is responsible for the complicated inter-working of engines and rolling-stock to which you refer.

[Reply to T. A. CARSON.]

Some Distances.

Newport to Cardiff, Great Western Railway, (main stations) is 11 miles, 61 chains; Victoria-Clapham Junction, 2 miles, 58 chains; Clapham Junction-Balham, 1 mile 77 chains; Balham-Mitcham Junction, 4 miles, 4 chains; Mitcham Junction-Sutton, 3 miles, 23 chains.

[Reply to "SUTTONIAN."]

Cuffley-Stevenage Line, Great Northern Railway.

At present the single line between Cuffley and Stevenage is used regularly by goods, but not by passenger trains. On the occasion of the recent accident at Welwyn, however, passenger trains passed over it for the first time.

[Reply to T. A. LITTLE.]

Cylinder Relief Valves.

These are fitted at the ends of the cylinders so that any condensation water which may have accumulated while the engine has been standing may be expelled by the steam when admitted. Whenever considered desirable the driver opens these valves on starting; hence the escape of steam to which you refer.

[Reply to "CHESHAM."]

Portmadoc, Croesor and Beddgelert Railway.

We have no information as to the prospects of proceeding with the construction of the Beddgelert section of this railway. It is hardly likely to take place while the North Wales Narrow Gauge Railway remains closed for traffic.

[Reply to "G.W.R."]

Wagon Numbering, Midland Railway.

A similar system is adopted in numbering Midland wagons as in numbering the locomotives, with the result that the numbers reached are higher than the total number owned. The latter figure is about 120,000.

[Reply to "DERBY."]

A Rail-side Embankment.

The embankment between Raynes Park and Malden Stations, London and South Western Railway, was constructed for accommodating the Metropolitan Water Board's mains, and has always been used for this purpose.

[Reply to R. S. JOHN.]

Great Western Railway Running Powers

In the RAILWAY YEAR BOOK, 1920, about to be published, you will find a new map of the Great Western Railway, which correctly shows the lines over which the company exercises running powers continuously.

[Reply to R.S.V.P.]

4-4-0 Compound Engines, London and North Western Railway.

To the best of our knowledge the compound 4-4-0 engines never work north of Preston, and the converted compounds of the "Renown" class only on rare occasions.

[Reply to E. LITTLE.]

Electric Locomotives, London and South Western Railway.

Two electric locomotives are owned, these having belonged to the Waterloo and City Railway, and being used for yard and works purposes at the carriage sheds and workshops.

[Reply to "VOCLAS."]

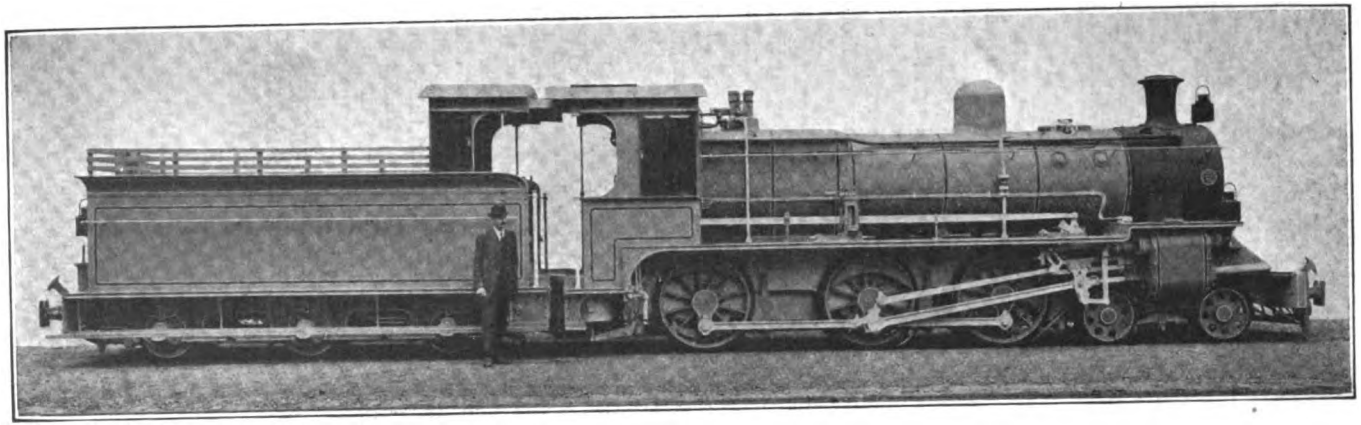
Midland Railway and R.O.D. Locomotives.

So far as we are aware, this company has not yet acquired any of the Great Central design 2-8-0 R.O.D. locomotives.

[Reply to "DERBY."]

Digitized by Google

4-6-0 MIXED TRAFFIC LOCOMOTIVE: ASSAM-BENGAL RAILWAY.



LOCOMOTIVES recently shipped from this country for service in India include some 4-6-0 mixed traffic engines, built in accordance with Indian standard specifications, and supplied for use on the Assam-Bengal Railway, metre gauge lines. These engines, one of which is illustrated herewith, have been built at the Hyde Park Works of the North British Locomotive Company. They are equipped with superheated boilers, a feature of which is the top feed arrangement, and the location of this device can be seen in the illustration, between the smokebox and the dome.

Leading dimensions are :—

Cylinders	16 in. by 22 in.
Coupled wheels	4 ft.
Working pressure	160 lb. per sq. in.
Heating surface—	
Tubes	600 sq. ft.
Firebox	108 sq. ft.
Total	708 sq. ft.
Superheater	112 sq. ft.
Total	820 sq. ft.
Grate area	15·3 sq. ft.
Weight in working order	36 tons 7 cwt.
Weight on coupled wheels	27 tons 13 cwt.
Tank capacity of tender	2,000 galls.
Fuel space	180 cubic ft.
Weight, full	24 tons 2 cwt.

Digitized by Google

PERTINENT PARAGRAPHS

0-10-0 Four-Cylinder Banking Locomotive: Midland Railway.

By the courtesy of Sir Henry Fowler, K.B.E., Chief Mechanical Engineer, Midland Railway, we are enabled to illustrate as frontispiece the new four-cylinder 0–10–0 locomotive recently placed in service for banking trains up the famous Lickey incline. This engine is interesting in being the first ten-coupled locomotive to be placed on regular duties on a British railway.*

No. 2,290 was turned out from the Derby shops in the middle of January, and is at present stationed at Bromsgrove for banking purposes on the Lickey incline, the gradient of which is 1 in 37·7, where it takes the place of two of the fairly heavy 0–6–0 type banking engines hitherto employed.

The boiler is fitted with a superheater of the usual Midland pattern, having 27 sets of elements. The firebox is 10 ft. long and has a grate area of 31½ sq. ft. The boiler barrel is 5 ft. 3 in. diameter and 14 ft. long. The firebox is tapered in two directions, the crown sloping downwards towards the back, and the two sides inwards in the same direction, the back plate being, in fact, similar to those used on the compound express engines. Four 3⅛-in. safety valves are fitted, set to blow off at 180 lb. though the boiler is designed for a working pressure of 200 lb. The boiler is fed by two hot-water injectors, and special provision is made for warming the water in the tender by utilising steam which otherwise would be blown off at the safety valves.

There are four cylinders, 16¾ in. diameter by 28-in. stroke. These are cast in pairs, one steam chest to each pair, and bolted together. The interesting feature of the cylinders is that cross ports have been introduced which make it possible for one piston valve to supply both cylinders on one side of the engine. The front piston valve head serves the front port of the outside cylinder and the back port of the inside cylinder, and *vice versa*. The covers at the back and front of the cylinders are the same diameter, which enable the cylinders for both sides of the engine to be cast off one pattern. The piston valves are 10 in. diameter and are driven by Walschaert's motion, the cut-off in full gear being 75 per cent. All the connecting-rods drive on to the middle axle. The incline is 1 in 7 to the horizontal, and the intermediate leading axle is cranked to clear the inside connecting-rod. Mechanical lubrication is provided both for the cylinders and axle-boxes, Midland lubricators being used. The engine is fitted with steam reverse gear, the steam and water cylinders being fixed to the frames close to the reversing shaft and operated through pipes and valves on the footplate.

Owing to the severe gradient on the Lickey incline, it is imperative that ample brake power should be available, and all the wheels are braked, the front three pairs being operated by a steam cylinder and shaft placed just behind the driving axle, and the two hind pairs of wheels by a cylinder and shaft placed under the dragbox. In addition, owing to the comparatively light tender, a hand brake has been fitted on the engine, and this acts on all wheels.

Leading particulars are:—

Working pressure ..	180 lb. per sq. in.
Heating surface—	
Firebox	158·25 sq. ft.
Tubes	1,560 ,,
Total	1,718·25 ,,
Superheater (27) elements..	445 sq. ft.
Grate area	31·5 ,,
Cylinders (four)	16¾ in. diam. × 28 in. stroke.
Wheels	4 ft. 7½ in. diam. on tread.
Tractive force at 85 per cent. boiler pressure	43,312 lb. = 19·336 tons.
	T. C. Q.
Total weight of engine in working order	73 13 1

* The Great Eastern Railway 0-10-0 tank engine No. 20 (the "Decapod") was purely an experimental machine, and was never used on regular traffic in that form.

Digitized by Google

	T. C. Q.
Total weight of tender in working order	31 11 2
Total weight of engine and tender in working order	105 4 3

The Rise in Railway Expenditure.

DURING the year 1919, a fair amount of new construction and a large quantity of maintenance and repair work were undertaken, while a greater volume of public traffic has its corollary on the expenditure side; but the enormous increases in gross expenditure, as compared with 1918, which are recorded by all the larger railway companies, and proportionately by others, amounting in several instances to from one to over six million pounds, gives "food for thought."

In 1918, war wages and bonuses applied, so that only a portion of the increase in payments to the staff has to be credited additionally to 1919. Such increases are, however, composite for included are not only the further grants in so far as they apply to employees who were concerned in the 1918 figures, but also those due to the employment of further men to meet the changed situation introduced by the eight-hour day and reduced shop hours, to deal with the greater volume of traffic, and required in consequence of the resumption of new construction and repair and maintenance work on a large scale, both on the lines and in the workshops. High costs of fuel, materials and purchased equipment have also contributed materially towards the very large increases on the expenditure side; but from whatever point of view the matter be regarded, increases such as those given below indicate vividly the changed situation with which our railways are faced.

Taking only the four largest railways in the United Kingdom, the following were the gross railway expenditure totals for 1918 and 1919:—

	1918.	1919.
	£	£
L. & N.W.R. ...	19,074,358	25,281,514
G.W.R.	16,194,567	21,792,343
M.R.	15,377,823	20,244,793
N.E.R.	12,431,482	15,801,591

These give increases of considerably over 6, 5, 4, and 3 millions respectively, and in the case of other railways, corresponding figures could be given.

Allocation of Increased Expenditure.

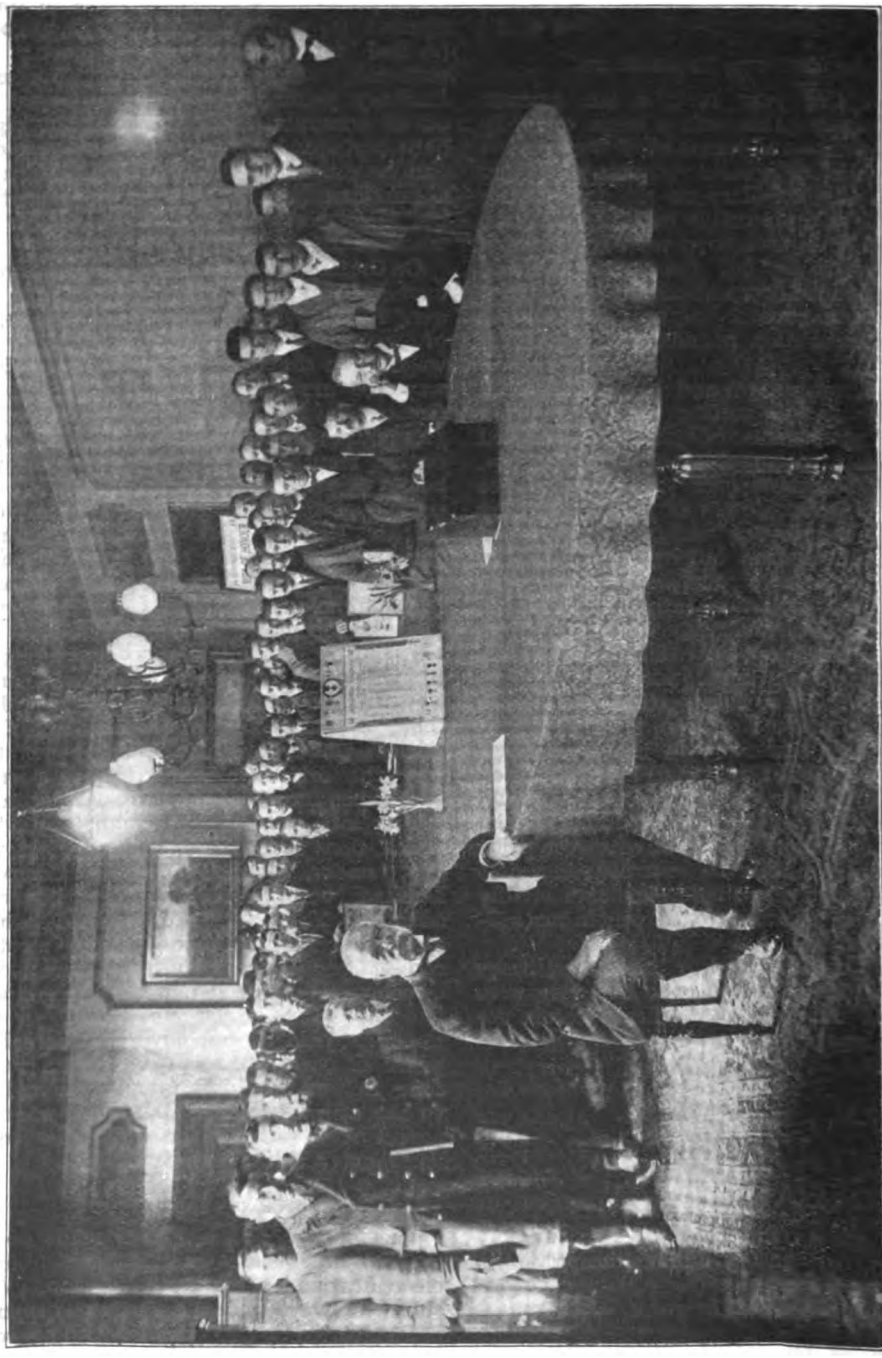
At several of the railway companies' meetings illuminating information was given by the respective chairmen as to how these great increases are made up. On the Great Northern Railway the expenditure increase over 1918 was £2,148,336, or 29 per cent., and this includes in round figures: (1) wages and salaries, £1,300,000; (2) fuel for locomotives, £243,000; (3) materials, etc., £357,000. Sir Frederick Banbury pointed out that the wages bill on all accounts, including increases, eight-hour day, etc., have amounted to £5,950,000, and he estimated that it would soon reach approximately to £7,000,000, or more than the total receipts from all sources for the whole of the year 1913.

On the Great Western Railway the increase over 1913 amounted to £11,386,234, and over 1918 to £5,597,776, about £3,300,000 of which is attributed to salaries and wages. In the case of the Midland Railway the increase was £4,866,970. On the Great Central Railway expenditure was £2,143,842 higher than for the previous twelve months, the total wages bill now being £5,718,943, an increase of 135 per cent, over 1913. In the case of the North British Railway, Mr. Whitelaw pointed out that whereas in 1913 wages absorbed 24¼ per cent. of the revenue and dividends to shareholders 27 per cent., last year the corresponding figures were 36¼ and 14¼ per cent.. These and corresponding increases on the lines apply to railways under Government guarantee, but in regard to those of the Associated Underground Companies which are not assisted in that way the difficulty of correlating revenue and expenditure is distinctly serious, even taking into account the common fund to which they are parties, and the fact that the London General Omnibus Company, Limited, was by far the most adversely affected. Thus, as Lord Ashfield pointed at the London Electric Railway meeting, receipts per passenger in 1919, were 2.04d., as compared with 1.48d. in 1913, but expense has risen from 1.36d. to 2.11d., so that the fares paid do not cover the actual expense of conveyance. This applies to the four railways and the omnibuses, and not to the railways alone; but from whatever aspect it is viewed the difficulties to be surmounted will be manifest.

Electrification Progress in 1919.

Last month reference was made to the encouraging results which have followed electrification on the Lancashire and Yorkshire Railway, and the further equipment contemplated by that company and proposals for the electrification of the Great Eastern suburban lines. The situation in this respect in regard to several other railways can now be considered. It is hoped that electrical

Digitized by Google



PRESENTATION TO BRIGHTON RAILWAY WAR HEROES: SCENE IN THE BOARD ROOM.

Digitized by Google

equipment of the Ealing and Shepherd's Bush Railway will shortly be completed by the Great Western Railway, while on the London and North Western Railway work is proceeding steadily with the Chalk Farm and Willesden widenings and alterations which must be completed before the full electric services of the London and North Western and North London Railways can be inaugurated. Traffic by the Broad Street electric services already shows an increase of about 25 per cent. The "Bakerloo"—Watford through service has developed considerably, and it is hoped to place in service shortly several of the new trains which are being built especially for this service.

Continued development is recorded by the London and South Western Railway. In 1913 local passengers in the area now electrified number 23 millions; in 1919, they amounted to nearly 48 millions, an increase of 70,000 a day. Additional rolling stock is being adapted for electrical working and it is intended to make up the trains from 6 to 8 vehicles. On the Waterloo and City line six-car trains will be run instead of five-car sets, while higher speed will raise the train capacity to 24 per hour at the busiest periods. We have already referred to the intended electrification of the North Eastern main line between York and Newcastle.

A Brighton Railway Presentation to War Heroes.

Those present in the Board Room of the London, Brighton and South Coast Railway at London Bridge, on Friday, February 27, will have pleasant recollections of the occasion when the employees who had received honours during the war met the Earl of Bessborough, K.P., Sir William Forbes (the General Manager), and other officials. Each hero was handed a letter artistically illuminated and framed as illustrated in the next column. This memento was from a design by Sir William Forbes, and the text, after the name of the recipient, reads as follows:—

"The Directors, officers and staff desire to tender a sincere welcome to you on your safe return to duty, after so gallantly serving your country in the great war, 1914-1919.

"They wish further to record their admiration of your conduct, and to offer their hearty congratulations on the fact that His Majesty the King has been pleased to recognise your services by conferring a distinction upon you."

The letter is signed by Lord Bessborough, Sir William Forbes, and Mr. J. J. Brewer (the Secretary). The Earl of Bessborough, upon entering the room, received quite an ovation. He was accompanied by Sir William Forbes, Messrs. J. J. Brewer, Finlay Scott (Superintendent of the line), H. A. Sire (Goods Manager), A. H. Panter (Carriage and Wagon Superintendent), G. Allen (Estate Agent), C. Cooper (Continental Traffic Agent), and G. H. Dennis (Publicity Superintendent.)

Lord Bessborough's Remarks.

His Lordship, in making the presentation, remarked that it was a day to which he had looked forward right from the beginning of the war. Some of those present,

BRIGHTON RAILWAY COMPANY'S LETTER TO WAR HEROES.

who were unable on account of age, infirmity, or other reasons, to take part in active service, often met during the war and held those who did serve in remembrance in their absence, wishing each of them well wherever he might happen to be, with the earnest hope of a safe and speedy return. Some, alas, had not returned, and these they remembered that day—their colleagues, fellow-workers and friends who had sacrificed their lives in the great fight for freedom. Those present had each received a distinction for brave conduct. It was accordingly thought that they would like to receive some official acknowledgment; hence the letter, in which was embodied the thanks of the Directors and officers of

Digitized by Google

the company. Out of a total of 5,617 of the company's staff who had enlisted, 9.19 per cent died on active service, 97 had been awarded honours, and of this latter number 13 had sacrificed their lives. The company deeply acknowledged their services, and were very pleased indeed to see those present that day, and to have them back again. He hoped the distinction they had received would stimulate them, if anything, in doing their duty, not only for the railway but for the country in general. All the meetings from August, 1915, to November, 1919, had concluded with the singing of "God Save the King," and at the end of that day's little ceremony he would like them to repeat it.

Lieut.-Col. Hutchence suitably acknowledged the testimonials on behalf of the employees, who endorsed his remarks with hearty cheers. The National Anthem was then sung, and a photograph was taken of the men. The company was then entertained to luncheon by Sir William. Forbes, General Manager.

War Honours and Decorations earned by the Brighton Railway men are as ollows :—

Distinguished Service Order ..	1
Military Cross	7 and 1 bar.
Distinguished Conduct Medal ..	13 and 1 bar.
Distinguished Service Medal ..	2
Military Medal	59 and 5 bars.
Order of British Empire (Military Division)	1
Meritorious Service Medal.. ..	13
French Croix de Guerre	2
Belgian Croix de Guerre	1
Italian War Cross	1
Italian Bronze Medal	1
Roumanian War Medal	1
Russian Order of St. George ..	1
Russian Order of St. Stanislas ..	1

ROLL OF HONOUR.

Total number of men enlisted ..	5,617
Percentage of Total Number in Company's Service	34·5
Percentage of Men Died on Active Service	5·19

New Track Facilities at Waterloo.

For some time past the London and South Western Railway has been handicapped in dealing with the highly developed traffic which has followed electrification of suburban lines, by the restriction of certain connections between running lines outside Waterloo station and some of the platforms. An improvement in track facilities is therefore being taken in hand in order to assist the working in and out of the platform roads, and the illustration on the opposite page shows the location of the new cross-over line which is being introduced to accelerate train working.

A very intricate arrangement of track is essential to meet the requirements, and, as the number of trains leaving Waterloo station daily has increased from 600 in 1914 to 1,000 in 1920, any delay in clearance at crossing points results in a contraction of line capacity.

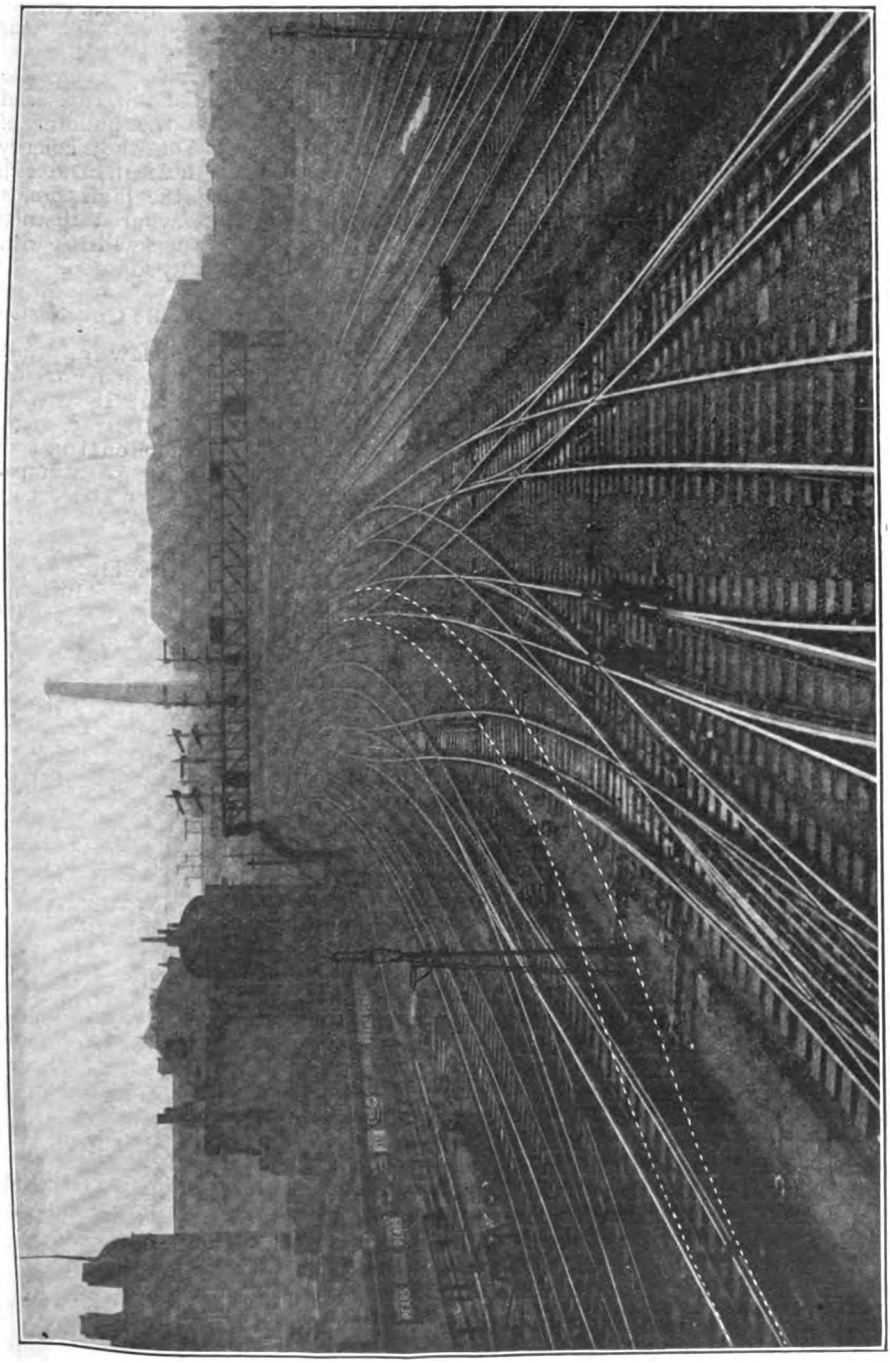
Outside the station there are nine running roads :—(1) Down main local ; (2) down main through ; (3) up main through relief ; (4) up main through ; (5) up main local ; (6) down Windsor local ; (7) down Windsor through ; (8) up Windsor ; and (9) a lead from the up Windsor into platform road 21. These lines branch into the 21 platform roads, the two loading dock roads in centre of the station and the berthing sidings at the northern side. The improvement chiefly concerns the up main through line. This at present leads into platforms 7, 8, 9, 10, 11, the two loading dock roads and platforms 12, 13, 14, 15, and 16. Its burdens in feeding so many roads would seem already to be sufficient, and this, indeed, has hitherto been the opinion, but in order to facilitate the working of the traffic, further responsibilities are to be placed upon it by the construction of the new lead line from it into platform roads 4, 5, and 6. With the aid of this new crossing it will be possible for a train to be worked into platforms 4, 5 or 6 from the up main through line at the same time as a train is being worked into platform roads 1, 2 or 3 from the up main through relief. Considerable alteration in the interlocking is involved, and it will be some little time before the crossing is brought into working.

Existing arrangements were presumably designed to relieve the "up through main," which carries traffic to all platforms, 7 to 16 inclusive, of traffic destined for platforms 1 to 6 inclusive. With this object the cross-overs from the up through main to the up through main relief were provided at "B" box, still further back. It has been chiefly the increasing density of the electric suburban traffic to and from Waterloo which has rendered the proposed change in these arrangements necessary.

The Forth Bridge now 30 years old.

THIRTY years ago the Forth Bridge was opened for traffic, and commenced to perform its invaluable service to the railways of Scotland. The first suggestions for a bridge over the Firth of Forth were made in the early part of last century, but it was not until 1873, when the indispensability of a through connection was fully realised,

Digitized by Google



APPROACH ROADS TO WATERLOO STATION, LONDON AND SOUTH WESTERN RAILWAY.—VIEW FROM "A" SIGNAL-BOX.
(The white dotted lines indicate position of proposed new lead.)

Digitized by Google

that a company was formed to carry out this scheme. The contracts for the work were let in 1877–78, but the building of the first pier of the bridge was not completed when the Tay Bridge disaster occurred, and work was immediately suspended.

Very soon, however, it became obvious that the gulf at Queensferry must be bridged in order to arrange a through rail route to the Far North along the east coast, and in 1883 the construction of the present Forth Bridge, designed by Sir John Fowler and Sir Benjamin Baker, was commenced under the direction of Sir William Arrol. The building of the bridge took seven years to complete, and it was opened on March 4, 1890, by the late King Edward, then Prince of Wales. The length of the bridge is 1 mile 1,005 yards; at extreme height it is 451 ft. high from foundation level and 361 ft. above high-water mark; at rail level 156 ft. above high-water mark. The total cost, including approach railways, was £3,500,000

The bridge is designed to withstand a wind pressure of 56 lb. per sq. ft., and it was severely tested during a terrific storm in January, 1890, when a wind pressure of 37 lb. per sq. ft. was registered. This was 7 lb. per sq. ft. higher than the wind force which wrecked the Tay Bridge.

Railways and State Responsibilities.

Mr. William Whitelaw, the well-known Chairman of the North British Railway Company, is always interesting when discussing public matters affecting railways, and in the course of a lecture delivered recently to the Economic Science Section of the Royal Philosophical Society of Glasgow, on "The Railways and the Nation in Peace and War," many frank criticisms and a number of important points were brought forward.

In regard to State responsibilities, Mr. Whitelaw expressed the opinion that the State, in dealing with the railways, had almost always acted short-sightedly. The first great mistake lay in failure to see the enormous political and social value of railways in every part of the country. Private companies could always be found to build railways in populous districts, but the deserts of the country had little attraction for the railway investor, and to-day the Government was quite unaware of the real value of railway communication to those parts of the country which were naturally poor and thinly populated.

If 20 years ago Parliament had provided money for building railways in the Highlands and similar areas and permitted county councils to guarantee their working expenditure, three-quarters of the problems waiting solution in such districts would long ago have been solved.

The mistaken policy of encouraging unlimited competition was now admitted. Wisely-regulated monopoly would have resulted in prosperous railway companies everywhere, have permitted low rates and fares, and made possible the building of railways to many parts of the country which still had none, those in the rich trading districts yielding the high profits, out of which many less favoured districts could have obtained railway facilities without ruinous results to railway finance.

The Eight-hour Day and Traffic Congestion.

On this subject Mr. Whitelaw expressed himself strongly. "The eight-hour day had much to commend it, but it was imposed too suddenly, and, being made universal, had resulted in duplicating staffs at some places where for the greater part of the year the former staff hardly knew how to get enough work to keep themselves warm. There must be quite a large number of stations in Scotland where the salaries of the staff were at least double the whole revenue collected, and the only sensible plan seemed to be to treat many of the appointments to such stations as suitable only for old men who would otherwise be retired. That plan would cost the country no more than if able-bodied men were appointed, the pensions would be saved, and there would be no risk of the old men being overworked."

In regard to the labour settlement Mr. Whitelaw pointed out that the recent negotiations were ostensibly conducted by the trained experts of the companies, but in fact they were the mere mouthpieces of the political element behind. He could not make it too clear that the settlement, if indeed it be a settlement, was made by the Government, and that the railway companies had absolutely no responsibility for it.

With reference to traffic congestion Mr. Whitelaw stated that shortage of wagons was caused by a number of things, and one of them was the number standing under load because a depôt was closed after eight hours' work. Another cause was the lack of engine power to perform shunting work expeditiously. On the North British line they were struggling with a huge traffic which had to be conducted by 100 fewer engines than before the war. Twelve per cent. was a reasonable number of engines to be under repair at once; they had now 22 per cent. under or waiting repair, the output of repaired engines being very small as compared with their requirements.

Digitized by Google

The Future of Railways.

On this topic Mr. Whitelaw said it was important to get rid of the misconception that the Act of 1844 solved all questions which would arise in the event of the State deciding to purchase the railways. He had heard the Act described as the railway companies' charter, but he was informed by the solicitor to the North British Company that the Act of 1844 was wholly inapplicable to the present position. He thought they might assume that nationalisation of the railways, including the working of them by the State, was at present quite out of the running, but the more limited form of nationalisation, under which railway stocks might be purchased by the State and the management entrusted to private working companies, had received too little consideration. One thing was admitted on all hands, namely, that for working purposes railway systems should cover large areas. Roughly speaking, half a dozen separate managements were sufficient for the whole of Great Britain. This reduction would be most easily and simply brought about by the State purchasing, by agreement, a large number of the smaller companies and leasing them to a few of the very large ones.

The same result could be obtained by other schemes, such as amalgamations or grouping of companies for working purposes, and, so long as railway shareholders were treated fairly, the actual plan adopted was of little or no importance to them. They would do well to concentrate their attention upon securing their absolute rights either through purchase or by guarantee of their whole pre-War net revenue by the State. Let them remember that, however fair any Minister of Transport might wish to be, there would always be the Treasury fighting for its own hand.

War Traffic on the Great North of Scotland Railway.

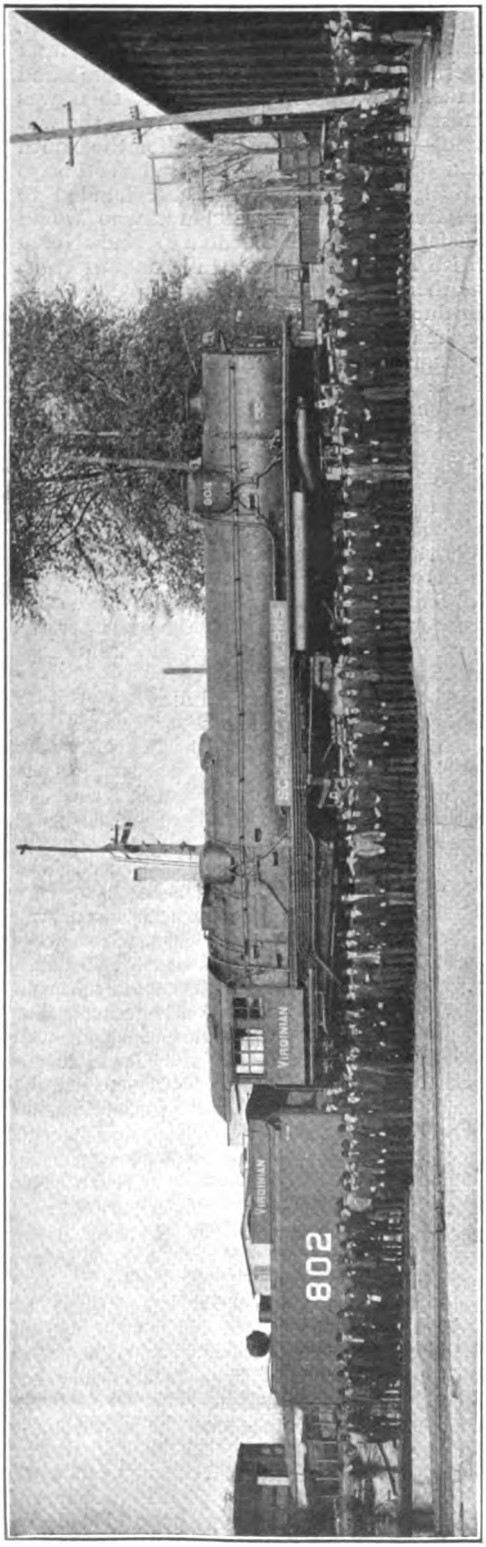
There are two points of view from which the war work done by the Great North of Scotland Railway—a line whose total length, geographically, is only 334 miles—may be more especially regarded: (1) relief afforded to the Highland Railway in the provision of an alternative route between north and south, and (2) the handling of, for a comparatively small railway, a large volume of traffic which either originated or terminated on the Great North of Scotland's own system. Assistance could be rendered to the Highland Railway by reason of the fact that the Great North of Scotland connects with the Highland at Keith, giving an almost direct line of communication from that point to Aberdeen. Thus, when the Highland's trunk line from Inverness to Perth, via Aviemore and Dunkeld, was congested—and this was almost normally the case as long as the war lasted—traffic from Inverness for the south could be taken by the Highland via Forres and Elgin to Keith, and there handed to the Great North of Scotland, who would transfer it to the Caledonian and North British Railways. From Inverness to Perth via Aberdeen meant a considerable detour; but during the stress of the mobilisation the Great North of Scotland ran, one Sunday, for example, no fewer than 21 troop specials off the Highland line from Keith to Aberdeen *en route* for camps in the south. In the five years from August, 1914, to August, 1919, the Great North of Scotland took 48,440 loaded and 9,033 empty wagons to and from Highland stations for conveyance via Aberdeen instead of via Dunkeld, while the total engine mileage run by Great North of Scotland engines over the Highland lines during the same period was nearly 500,000 miles. Naval ambulance trains from the Highland line were frequently run at short notice.

In January, 1915, the Admiralty opened a naval store in Aberdeen Harbour as a relief to Invergordon, where the amount of traffic to be handled was beyond the scope of the available facilities. The Great North of Scotland set apart an engine for shunting work on the harbour railway at Aberdeen, on which all wagons between the Caledonian and North British yards and the store were hauled. The number of these wagons was 67,823, and the estimated weight of their contents was 297,891 tons. Peterhead Harbour, north of Aberdeen, was adopted by the Admiralty as a convenient place for the bunkering of mine sweepers and other vessels, and thither the Great North of Scotland carried, for this purpose, 16,087 tons of Welsh coal and 72,018 tons of Scotch coal—88,105 tons altogether.

Timber and other Traffic.

Large quantities of timber for railway sleepers or pit-props (the former being wanted in France as well as in this country) were cut in the district served. The Canadian Forestry Corps had camps at Kemnay, Knockado and Nethybridge, and in each instance the company provided sidings and worked the trains. A large quantity of timber was also cut by German prisoners at a camp on the Strathspey section. The total quantity of timber carried in 1918 amounted to 238,328 tons, as against 53,797 in 1913—an increase of 181,531. The Government erected a large

Digitized by Google



2-10-10-2 ARTICULATED LOCOMOTIVE, VIRGINIAN RAILWAY, AND ERECTING STAFF.

airship station at Lenabo, 3½ miles from Longside station on the branch from Maud to Peterhead. The company built a line to connect with the airship station, and the total amount of traffic conveyed to the latter during the war period was 31,913 tons.

Prior to the war there was carried on at Peterhead, Fraserburgh, Buckie and other ports served by the Great North of Scotland a considerable industry in the curing of herrings, which were sent to German and other European markets. With the war this business ceased, and the fresh herrings were, as soon as landed, despatched by special passenger trains to various markets at home. Extra work was thus thrown on the railway, the company handling 53,302 tons of fresh herrings in 1918, an increase of 46,215 tons over the total for 1913.

From the locomotive workshops at Inverurie, 70 transport wagons, 350 picketing posts, 3,500 picketing pegs, 64,090 adapters for graze fuse No. 100, 12,017 grenade dischargers, 24 regulation ambulance stretchers, and 4 snow ploughs for service in France were supplied. Immediately on the outbreak of war an ambulance train was equipped under conditions of great urgency. Later on, two passenger train vans were fitted up as naval ambulance vans. In addition to being used by the Admiralty, the vans were employed by the Red Cross Society to convey men to convalescent hospitals. Shortly after the armistice the company provided a train of passenger carriages for temporary use in France. They despatched the train, which consisted of 31 vehicles, on January 17, 1919. It was returned at the end of the following March.

2-10-10-2 Articulated Locomotive, Virginian Railway.

A REMARKABLE view is reproduced of one of these engines, taken at the Schenectady Works of the American Locomotive Company, and showing also the erecting staff, indicating incidentally, in vivid fashion, the enormous dimensions of this locomotive.

Leading dimensions are as follows:—Cylinders, 30 by 48 by 32 in.; Coupled wheels, 4 ft. 8 in. diameter; boiler pressure, 215 lb. per sq. in.; heating surface, tubes, 5,580 sq. ft., flues 2,510 sq. ft., firebox, 437·5 sq. ft., arch tubes, 78·5 sq.ft., total 8,605 sq. ft.; superheater, 2,120 sq. ft.; grate area, 108·7 sq. ft.; weight in working order: engine 305¼ tons, tender 96 tons, total 401¼ tons.

Digitized by Google

Special Munitions Traffic on the Midland Railway.

DURING the war period no fewer than 97 new munition centres were established on the Midland system, bringing the total to 258, many of the existing premises being largely extended. At Attenborough, Notts., the Chilwell National Shell Filling Factory provided the Midland line with traffic on such a scale that the maximum attained for any one year during the course of the war reached the enormous total—for a single works—of 1,091,000 tons. The greatest daily number of wagons of shells worked away from the place by the Midland Railway was 539. The corresponding maximum for trains of shells per day was 11. In order to facilitate this traffic, the Midland laid down at the factory 2½ miles of sidings. At the Quedgeley Filling Factory, near Gloucester, the Midland Railway provided nearly 3 miles of sidings, and they had further to undertake the conveyance of 4,500 workpeople daily between the factory and their homes in the surrounding district.

Passenger traffic to be dealt with in connection with the Government factories at Longbridge (Birmingham district) was still heavier. The works had been established prior to the war, but the Government took them over, and not only extended the premises, adapting them to the manufacture of munitions, but put up two additional factories. The work carried on was chiefly concerned with the re-lining of guns and the production of aeroplanes, aeroplane engines and shells. The number of workpeople employed, and requiring to be conveyed daily from and to their homes, was, approximately, 12,000. The total number of workmen's trains run to and from Longbridge and Quedgeley per month was 1,026. Taking the whole of the Midland system, the total number of trains run daily for munition workers was 75. In addition to this, large numbers of workers travelled by ordinary trains.

The extent and nature of the demand made upon the transportation facilities o the Midland Railway in connection with the war manufactures produced under the conditions here indicated may be judged from the following instances:—Birmingham district: A large number of aircraft engines, 40,000 motor cycles, 500,000 bicycles, 12,000 tons of saddlery, 5,500 tons of parts for wire entanglements 3,200 general service wagons; Manchester: 80,000 tons of steel billets; Northampton: 15,000 tons of boots, &c.; Cheltenham: 6,000 tons of material for aeroplane construction: Mangotsfield: 20,000 tons of explosives; Earby: 89,000 tons of explosives; Warmley: 9,000,000 hand grenades.

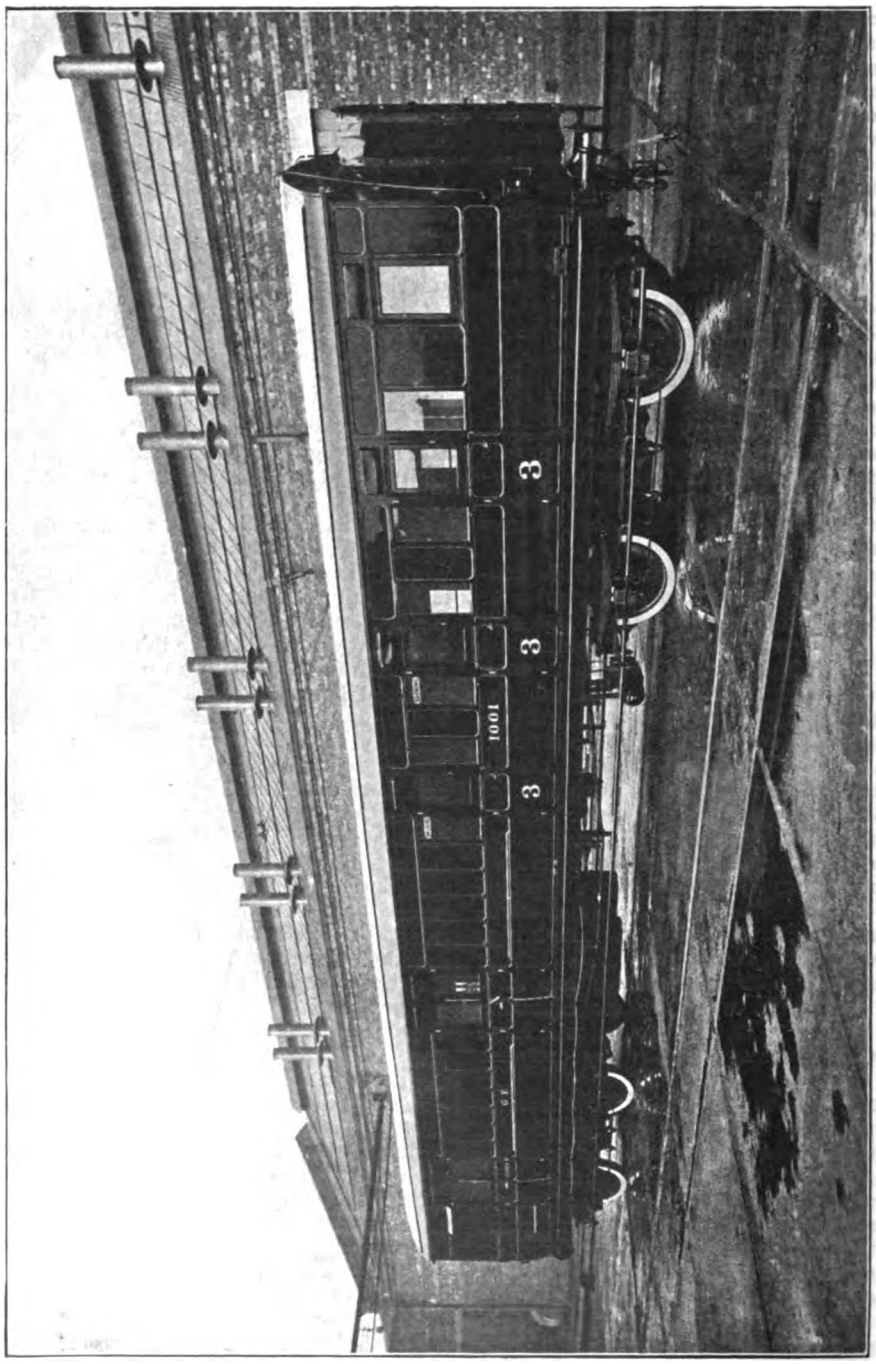
Some Traffic Statistics.

GREAT difficulties were experienced in providing vehicles for the increased volume of traffic which required the use of special vehicles, included therein being such consignments as aeroplanes, "tanks," tractors, heavy guns and armour plates. There were carried, for example, armour plates weighing as much as 32 tons each. In one instance the plate measured 47½ ft. in length. An anvil block weighed as much as 131 tons; a hammer block weighed 80 tons, while the numerous shafts carried were up to 14 tons in weight and 80½ ft. in length.

Conveyance of naval and military personnel and their baggage, &c., involved the running of 11,502 special passenger trains. The number of officers and men conveyed in the special trains was 2,282,000. Between 7 a.m. on Saturday, August 15, and 1 a.m. on Sunday, August 16, 1914, there were loaded and worked from Derby and Burton to the Luton area 65 special trains; and between 5 p.m. on Saturday, August 15, and 10.30 p.m. on Sunday, August 16, 67 special trains were worked from Carlisle to Bedford, the two movements overlapping for a considerable period. These movements entailed, in combination, the running in two days of over 50,000 train-miles. Vast quantities of war material from Scotland, the North Eastern Railway, the Lancashire and Yorkshire Railway, and the ports of Liverpool and Manchester passed over the Midland lines, and were transferred to those of other companies for camps, arsenals, munitions factories, ports and dockyards situate mainly in the south. During one typical week there were hauled between England and Scotland (apart from Admiralty coal traffic) a total of over 45,000 wagons, and of these approximately 38 per cent. went by the North Eastern route, 29 per cent. by the Midland, 29 per cent. by the London and North Western, and 4 per cent. by the Maryport and Carlisle. After the completion of the Georgetown Filling Factory, in 1917, a constant service of trains for the conveyance of shells to be shipped from Newhaven to France was maintained by the Midland Company between Carlisle and Battersea, where they were handed to the London, Brighton and South Coast Railway.

Comparing their heaviest war year with 1913, the Midland carried therein 18,000,000 more passengers, an increase of 14 per cent., and 3,220,000 tons more of goods and minerals, an increase of 6 per cent. The maximum weight of Government "free" traffic carried by the company in any one war-year was 4,188,479 tons. Under the operation of the coal control scheme, it may be mentioned that in 1913 the Midland worked 13,052 coal trains into London,

Digitized by Google



NEW THIRD CLASS CORRIDOR BRAKE COMPOSITE CARRIAGE, GREAT EASTERN RAILWAY.

Digitized by Google

whereas the total for 1917 was 22,348 trains, an increase of 71 per cent. The greatest number of coal trains worked to London by the Midland in any one day during the war period was 80.

The total number of ambulance trains dealt with at stations on the Midland system was 3,982. The number of patients carried was 339,000, namely 190,000 cot cases and 149,000 sitting cases.

Direct War Service.

For service overseas the Midland Railway contributed 78 engines, about 6,000 10-ton and other wagons, and 50 brake vans. They also supplied 28 miles of track with the necessary sleepers, chairs, plates, &c. The provision of these articles involved the closing of the branch line between Bennerley Junction and Kimberley (Notts.), the closing also of Kimberley and Watnall Stations, and the conversion of 25 miles of double track to single. The number of members of the staff who joined the Forces was 21,813, namely, salaried staff, 2,574; wages staff, 18,239. The first-mentioned figure was equal to 29 per cent. of the pre-war male staff. The number who received commissions was 350. Medals or other decorations were awarded to 359. There was a heavy casualty list, 6,451 being either killed, wounded or missing.

The manufacture of munitions of war was actively carried out at the Derby works, the plant being, by arrangement with the Government, supplemented by special plant. Output included the following items:—7,400,000 cartridge cases renovated, 2,500,000 complete fuzes made, 1,350,000 fuze adapters and gaines, 1,300,000 copper driving bands, 25,000 gun mountings, 4,500 aircraft, &c., bombs, 48 howitzer carriages complete, hundreds of thousands of details for guns, armoured cars, aircraft, tanks, &c. 1,500 general service wagons, 100 meat vans, 750 20-ton covered wagons, 40 trollies for conveyance of tanks, and 9 complete ambulance trains for use in this country, France and Egypt.

All six sea-going steamers owned by the Midland Railway, together with their sea-going tug, were taken over by the Government. The six ferry steamers, employed to work the ferry between Tilbury and Gravesend, and, also, to tender ocean-going vessels lying in the River Thames, were retained on these duties throughout the war. Of the sea-going steamers three, namely the *Antrim*, the *Donegal* and the *Londonderry* were used for troop transport and other purposes. The *Donegal*, whilst carrying wounded from France to Southampton, was torpedoed and sunk, April 17, 1917. Two other of the sea-going steamers, the *Duchess of Devonshire* and the *City of Belfast*, were used as armed boarderers. The other sea-going boat, the *Manxman* was used as a sea-plane ship and was subsequently sold to the Government.

New Corridor Coaching Stock, Great Eastern Railway.

An order for 40 third-class corridor carriages for the Great Eastern Railway is at present being executed by the Midland Railway Carriage and Wagon Co., Ltd., to whom we are indebted for the photograph reproduced on the opposite page.

These vehicles measure 54 ft. long outside the body over mouldings, by 8 ft. 9 in. wide, the height inside from floor to ceiling in the centre being 7 ft. 8½ in. clear. Length over headstocks is 53 ft. 4½ in., and width between sole bars 6 ft. 10 in. Wheelbase is 45 ft., and each bogie has a wheelbase of 8 ft. Each carriage has a through corridor, three passenger compartments, each capable of seating eight passengers, one lavatory, and one combined guard's and luggage compartment, 29 ft. 10⅝ in. long. Framing is of oak, and the bodies are finished on the outside with Lysaght's charcoal steel panels.

The passenger compartment ceilings and the backs above the panelling are lined with asbestos composition boards ⅛ in. thick and finished with "Anaglypta" of a suitable design.

The framing of the corridor partitions and all sliding doors is of oak with oak panels, whilst the corridors are panelled in oak throughout. All the sliding doors are hung on Crittall's ball bearing runners, and when in the open position are checked to prevent them automatically closing. They are fitted with fastenings of Great Eastern Railway pattern. The passenger compartments are fitted with woven wire seats. Floors throughout the vehicle, with the exception of the guard's and luggage compartments, are covered with plain cork covered linoleum ⅛ in. thick.

The outside doors, with the exception of those of the guard's and luggage compartments, are fitted with Kaye's patent locks with safety catches and inside handles. The doors of the guard's and luggage compartments are fitted with Hobbs and Hart's "A" locks. The gangways are built to British standard dimensions, the collapsible portions of the vestibules being of strong three-ply canvas, a leather cover of the Great Eastern Railway's pattern being fitted on the top of each gangway.

Details of Equipment.

Lighting is on Stone's system. Each passenger compartment is fitted with an

Digitized by Google

enclosed lamp holder containing two 12-watt metal filament lamps. Three single lamps in enclosed holders are fitted in the corridor and one in each lavatory compartment. The guards and luggage compartment is fitted with three enclosed lamp holders, each containing two lamps. Two single tail lamps are fitted and controlled by independent tumbler switches, free of the main switch. Switches are fitted at opposite corners on the ends of the carriages to enable the light, excepting the tail lamps, to be switched on or off from either side, outside or inside.

Brake equipment is Westinghouse automatic brake and the Westinghouse system of steam heating is fitted, with a heater under one seat in each passenger compartment, the size of the heater being such that not less than 4½ sq. in. of heating surface per cubic ft. of compartment is assured. Each heater is provided with a regulator by means of which passengers can regulate the degree of heat within the compartment. The guards and luggage compartment is fitted with a vertical heater, 6 ft. long by 5 in. diameter, with regulator for turning steam on and off. A steam heater pressure gauge is provided in this compartment, and the apparatus is installed in such a manner as to ensure a thorough draining of the system.

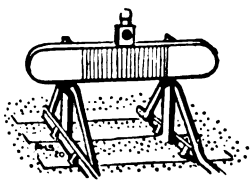
Underframes and bogies are of the Great Eastern Railway Company's standard type, built of steel channels, angles, etc. Compartments are upholstered in red velvet and have green rep spring roller blinds, map and photo frames being fitted immediately under the hat racks with an oak panel above the framing. The walls of the lavatory compartment are fitted with an imitation green tile pattern paper, the ceiling being painted white, and the woodwork, including the door, of polished oak as in other parts of the carriage. The length of each passenger compartment is 6 ft. 4 in. between partitions.

The carriages are built to the design and specification of Mr. A. J. Hill, Chief Mechanical Engineer of the Great Eastern Railway, and represent a thoroughly good example of modern railway carriage design and construction. The compartments are roomy and well equipped in every way.

Locomotive Power Classification on the Great Western Railway.

In conjunction with the preparation of special loading tables for use in compiling goods train loads, with others specifying maximum loads over various sections, all locomotives have been classified in five groups; known as A, B, C, D and E, the principal classes of engines being allocated as follows :—

	Group A.	
0-6-0	Standard tender goods	
0-6-0T	,, tank ,,	
4-4-0 (6 ft. 8 in.)	City type	.. 3700 to 3719
4-4-0 (6 ft. 8 in.)	Flower type	.. 4100 ,, 4170
4-4-0	35XX type	.. 3521 to 3560
	Barnum type	.. 3206 ,, 3225
	Group B.	
4-4-0 (5 ft. 8 in.)	Bulldogs	.. 3300 ,, 3455
4-4-0 (5 ft. 8 in.)	Dukes ..	.. 3252 ,, 3291
	Group C.	
4-6-0 (6 ft. 8 in.)	Saints ..	2900 ,, 2955
		2971 ,, 2990
		— ,, 2988
4-4-0 (6 ft. 8 in.)	County ..	.. 3800 ,, 3839
4-4-0T (6 ft. 8 in.)	County tank	.. 2221 ,, 2250
2-6-2T	44XX ..	.. 4400 ,, 4410
	45XX ..	.. 4500 ,, 4554
	Group D.	
4-6-0 (6 ft. 8 in.)	40XX ..	.. 4000 ,, 4060
2-6-0	26XX ..	.. 2600 ,, 2680
2-6-0	43XX ..	.. 4300 ,, 4399
	53XX ..	.. 5300 ,, 5389
2-6-2T	31XX ..	.. 3100 —
		3111 ,, 3190
2-8-0	30XX ..	.. 3001 ,, 3020
	47XX ..	.. 4700 —
	Group E.	
2-8-0	28XX ..	.. 2800 ,, 2883
2-8-0-T	42XX ..	.. 4201 ,, 4261



Digitized by Google

MR. P. C. TEMPEST, who from April 1 becomes General Manager of the South Eastern and Chatham Railway, was born in Leeds, the son of a solicitor. Educated at the City of Leeds Grammar School and Leeds University, he was articled to the Leeds Borough Engineer, and subsequently commenced his railway career on the London and North Western Railway extension into Leeds. Later he entered the service of the South Eastern Railway and was appointed Permanent Way Engineer in 1895. He became Chief Engineer upon the amalgamation of the South Eastern, and London, Chatham & Dover Railways in 1899. During the War he performed a vast amount of valuable Engineering work for the British Government. RAILWAY MAGAZINE readers will join in congratulating Mr. Tempest upon his new appointment. We hope to insert his portrait in a subsequent issue.

* * *

MR. WALTER ALEXANDER REE, who has been appointed Outdoor Goods Manager for the London and North Western Railway, was educated at Rossall School, entering the railway service in September, 1892, in the goods department at Waterloo, Liverpool. After holding various positions, he was appointed District Traffic Superintendent at Swansea in January, 1906. In January, 1909, Mr. Ree took up the position of District Goods Manager at Wolverhampton, which position he held until August, 1911, when he was made Outdoor Goods Manager for the Southern Division in succession to Sir Herbert Walker (then Mr. H. A. Walker). The Southern Division Outdoor Goods Manager's Office at that time was removed from Euston to Birmingham. In 1912 Mr. Ree took up the position of Outdoor Goods Manager for the Northern Division, at Exchange Station, Manchester, but returned to Euston as Outdoor Goods Manager for the Southern Division in June, 1913, which position he held until, as a result of the retirement of Mr. W. J. Chipman, he becomes Outdoor Goods Manager for the whole of the line.

MR. W. A. REE,
Outdoor Goods Manager,
London & North Western Railway.

* * *

CAPTAIN H. W. BINDLEY, Engineer's Assistant, North Staffordshire Railway, has been appointed an Assistant Engineer (open lines) on the Federated Malay States Railways. He served his pupilage on the North Staffordshire Railway under the late Mr. G. J. Crosbie-Dawson, M. Inst. C.E., and Mr. F. A. L. Barnwell, M Inst. C.E., and subsequently served four and a-half years in the Royal Engineers in France and England, and ten months on the staff of the Adjutant-General, General Headquarters. He was demobilised January, 1919, and rejoined the North Staffordshire Railway as an engineer's assistant. Captain Bindley was elected Associate Member of the Institution of Civil Engineers in 1918; Associate Fellow, Permanent Way Institute, in 1919; and

Digitized by Google

Associate Member of the Institute of Railway Signal Engineers in 1919.

* * *

MR. T. C. HIGGINS, who retires from the service of the Great Central Railway, under the age limit, on March 31 this year, entered the service (then the Manchester, Sheffield and Lincolnshire Railway) in December, 1875, in the goods department at Oldham; but in March, 1876, was transferred to the Mineral Manager's Office, Manchester, where he remained, occupying various positions, until February, 1897, when, preparatory to the opening of the Great Central Railway's London extension line, he was appointed London District Mineral Agent. In September, 1898, he returned to Manchester to the Mineral Manager's Office as Chief Clerk, and on October 1, 1905, was made Mineral Manager, the headquarters of the department then being in Manchester. In March, 1907, the department of the Mineral Manager was moved from Manchester to Chesterfield, Market Place Station, on the transfer, as from January 1, 1907, of the system of the Lancashire, Derbyshire and East Coast Railway to the Great Central Railway.

Photo.] [*Lafayette.*

MR. T. C. HIGGINS,

Retiring Mineral Manager,
Great Central Railway.

* * *

ON the retirement of Mr. John Blackburn, M.A., from the secretaryship of the Caledonian Railway, the officers of the line entertained him to dinner in the Central Station Hotal, Glasgow. Mr. Blackburn has held the office of Secretary of the Caledonian Railway for nearly 30 years. Educated at Eton and Oxford, he was called to the Bar, Inner Temple, in 1880. Subsequently he acted as private secretary to the Marquis of Lothian, Secretary for Scotland, from 1887 to 1891, in which latter year he was appointed Secretary of the Caledonian Railway. In bidding Mr. Blackburn farewell, the officers of the Caledonian Railway, through Mr. Donald A. Matheson, General Manager, who presided, conveyed to him their high appreciation of his persona qualities, and their best wishes for his future happiness, and presented him with pieces of silver—a salver of date 1820 and a coffee pot of date 1778—as a memento of their long and happy association with him. Mr. Blackburn's resignation took effect at the end of February, and he proposes to reside in London.

* * *

AT the head offices of the Lancashire and Yorkshire Railway at Manchester recently, Richard Pilkington, platelayer, and W. A. Mitchell, engine driver, were presented with a testimonial and a wallet of Treasury notes in recognition of their presence of mind in an emergency on December 24 last. Immediately before the approach of the 7.5 a.m. express from Blackpool to Manchester, Pilkington noticed an obstruction on the line, and by waving his handkerchief attracted the attention of Mitchell, who was enabled to stop the train in time. The presentation was made by Mr. W. Lauder, of Ansdell, on behalf of the passengers.

* * *

A MASS meeting of railwaymen at Peterborough expressed thanks to Canon Donaldson for his counsel and support in the critical events of the recent strike. A presentation was made of a cross and candlesticks for the altar of Paston Church, Peterborough, of which Canon Donaldson is rector. The following is the inscription on the back of the cross:—"Presented to the parish church of Paston by all grades of railwaymen of Peterborough and district in commemoration of the great strike of 1919, and in thanksgiving for the settlement of 1920, and for the progress made by the railwaymen towards a fuller and happier human life."

* * *

A BEAUTIFUL memorial has been unveiled at Nitshill Station, on the Glasgow, Barrhead and Kilmarnock Joint Railway, by Lady Lorimer, wife of Sir William Lorimer, LL.D., one of the directors of the company,

Digitized by Google

in the presence of a large company of the chief officials and prominent local people. Lady Lorimer, after gracefully drawing aside the Union Jack flag covering the monument, said, "She deemed it a great honour to have been asked to take part in this most impressive ceremony. Nitshill was but a small place on the map of Scotland; but it had produced men of great valour and bravery, among the noblest and best of them was our hero, our friend and comrade, Sergeant John Meikle, Military Medallist, and winner, by an act of great bravery on the field of battle, of the proud distinction of the world-honoured Victoria Cross." The monument is a beautiful example of the sculptor's art; it is in red granite, and bears the simple inscription, "In memory of Sergeant John Meikle, V.C., M.M., late clerk at Nitshill Station, who enlisted in H.M. Forces (Seaforth Highlanders), February 8, 1915, during the great war, and was killed in action on July 20, 1918. Erected by his railway comrades."

* * *

A brass tablet has been placed in the office of the Chief Goods Manager of the Great Central Railway in memory of the members of the Chief Goods Manager's office staff who fell in the war. The unveiling ceremony took place on Tuesday, March 16. After an impressive address by the Bishop of Willesden, Mrs. Rostern (the wife of the Chief Goods Manager) unveiled the tablet. The orchestra, composed of Mr. Hagon (first violin), Miss Prewett (second violin), Rev. A. P. Turnbull, M.A. ('cello), and Mr. Fildes (organ), gave effective renderings of the "War March from Athalie" (Mendelssohn) and "March Funebre" (Chopin). The hymns "Now thank we all our God," and "O God our help in ages past" were sung. The roll call was taken and the service conducted by Mr. W. Mc. A. Gracie (Chief Clerk). A laurel wreath was placed at the foot of the tablet by Mr. Stanley Rowbottom, on behalf of the Old Comrades Association of the Chief Goods Manager's office. After the Bishop had pronounced a benediction, the ceremony was brought to a close by the singing of the National Anthem. Amongst those present at the ceremony were the relatives of the fallen members of the staff, and also Rev. L. J. Percival (Rural Dean of St. Marylebone), Rev. R. C. Gillie (President-Elect of the Free Church Council), Rev. James Cregan, Mr. J. Rostern (Chief Goods Manager), Mr. E. A. Clear (Assistant General Manager), Mr. S. L. Murgatroyd (Permanent Way Engineer), Mr. E. Livesley (Assistant-Goods Manager), and Mr. Puleston (London Estate Agent).

MR. C. L. MACDONA, O.B.E., who served his apprenticeship in the Traffic Departments of the North Eastern and Lancashire and Yorkshire Railways, and who, for the last three years of the War was M.F.O. to the British Expeditionary Force in

Photo.] [*Lafayette.*

MR. C. L. MACDONA, O.B.E.,

Traffic Department,
Beira & Mashonaland & Rhodesia Railways.

France, has sailed to join the Traffic Department of the Beira and Mashonaland and Rhodesia Railways.

* * *

THREE new members were elected at the March general meeting of the Railway Club at 92, Victoria Street, London, S.W. Mr. Basil M. Bazley presided, and at the conclusion of the ordinary business the Rev. A. Cunningham Burley formally introduced for club usage the reading desk, the materials for which had been secured through the intervention of that gentleman. In the course of his remarks the speaker referred to the intrinsic interest attaching to the desk, since it was made entirely from the timber forming part of the Lock Gates at Wandsworth of the old Surrey Iron Railway, which was demolished last year. Mr. J. G. Ford-Stevens then read his paper, "Goods Train Operation," which he specially illustrated by two diagrams. This, the first paper to be given by the lecturer, was followed with full interest by the meeting, as it dealt at length with the marshalling, classification, speed and working of

Digitized by Google

goods trains, and explained the systems of running tracks and siding "lay-outs" most suitable for the efficient handling of goods and coal traffic. A discussion followed, and the meeting concluded by passing a vote of thanks to the lecturer and to Mr. Burley for their contributions to the pleasure of the evening. A special general meeting is to be held at 92, Victoria Street, S.W., on Friday evening, April 23, at seven o'clock when Mr. R. H. Cunningham, A.M.S.E. will present a paper entitled "Some Engineering Work done by the 277th Railway Coy. (R.E.) in France and Belgium."

* * *

UNDER the conductorship of Colonel Galloway the Great Eastern Railway Musical Society has passed through a triumphant winter season. At the recent concert at Cambridge two princes of the British royal house sat beside Major-General Sir H. W. Thornton, K.B.E., the General Manager of the Great Eastern Railway. Subsequently from Mr. Louis Greig, Colonel Galloway received the following letter:—"I am desired by T.R.H. Prince Albert and Prince Henry to ask you to convey to the members of the Great Eastern Railway Musical Society T.R.H. sincere thanks and very hearty congratulations on the splendid programme they attended last night. They appreciated the music very much, indeed, and find it difficult to realise that the performers are musicians, as it were, 'only in their spare time.' They also ask me to thank you personally for the excellent arrangements that were made." As announced in the March RAILWAY MAGAZINE, the Society is arranging a grand concert in the Queen's Hall, London, on Saturday, April 17, to commence at 7.30 p.m. In addition to a male voice choir of 230 and full orchestra, eminent soloists have been engaged. For the success of the Society's many ventures much of the credit must be given to the Hon. General Secretary, Mr. A. W. Headley, of the Chief Mechanical Engineers Department, Stratford, Great Eastern Railway.

* * *

OWING to the indisposition of the President, the inaugural meeting of the Institute of Transport, which was announced in the March RAILWAY MAGAZINE to take place on March 15, had to be postponed until March 22, too late for extended reference in this issue. The gathering took place at the Institution of Civil Engineers, Great George Street, Westminster, S.W.1, when Sir Eric Geddes, G.C.B., G.B.E., M.P., delivered his presidential address. A series of ordinary meetings is being arranged for the current session, at which papers bearing on transportation subjects will be read by prominent authorities; arrangements for meetings of graduates and students are also to be made. All communications should be addressed to Mr. H. E. Blain, Hon. Secretary (*pro tem.*), 2 and 3, The Sanctuary, London, S.W.1.

* * *

FOR the fifth year in succession the operating department of the London Underground Railways and General Omnibus Company, Limited, is carrying on its efficiency meetings at the Training School, Milman's Street, Chelsea. At a recent gathering of 350 members, Mr. H. E. Blain, Operating Manager, presided, and a paper entitled "The Source of Power for our Railways," was read by Mr. P. V. McMahon, Superintendent of Power. Mr. Blain and others who took part in the subsequent discussion, highly complimented Mr. McMahon on the very comprehensive presentment of his subject.

* * *

AT the Institution of Civil Engineers the 26th "James Forrest" Lecture will be delivered at the Institution on Tuesday, April 20, at 5.30 p.m., by Sir Dugald Clerk, K.B.E., F.R.S., M. Inst. C.E., the subject being "Fuel Conservation in the United Kingdom."

* * *

THE Midland Railway has produced some striking figures showing the punctuality of its trains during 1919. Out of a total of 29,967 express passenger trains, 25,819, or 86 per cent., were either punctual or not more than five minutes late, the great majority, namely, 20,752, being actually on time. Of the local trains, numbering in all 411,398, 297,671 were on time, and 73,996 not more than five minutes late. In other words, 90 per cent. were either punctual or not more than five minutes late.

* * *

DEALING with the criticism of the new railway rates, Lord Faiingdon, Chairman of the Great Central Railway, remarked at the recent meeting of shareholders that it seemed to be generally recognised that railways, as common carriers, must be allowed to adjust their charges to meet increased outgoings, many of which they had no share in fixing. Giving the effects of some of these charges on prime necessities, he said that from the greatest fish market in England, and possibly the world, namely, Grimsby, the cost of carriage of dried or salted fish to Manchester was only from ·08 to ·09 of a penny increase, and on cod, soles, &c., from ·11 to ·13 of a penny, which were practically inappreciable figures. Taking other rates, flour from Grimsby to Leicester

Digitized by Google

was increased only ·04d. per pound, and potatoes from Crowle to Manchester were only ·02d. more, or one-fiftieth of a penny. He gave these quotations to show that they could disclaim any attempt at profiteering.

* * *

APPROVAL of the Ministry of Transport has been obtained by the North Eastern Railway to a large scheme for new wagon shops at Darlington. At present the wagon building as well as wagon repairing is carried on at York and Shildon, and neither of these works lend themselves to extension. Some years before the war the North Eastern Railway bought a large area of land at Darlington for the purpose of erecting a central wagon-building establishment there, and it is proposed to proceed at once with that scheme at a cost of considerably over half a million. When it is completed, the company's intention is to centralise the wagon building at Darlington, leaving the works at York and Shildon for repairs only.

* * *

AT the annual general meeting of the proprietors of the London and South Western Railway, the Chairman, Brig.-Gen. Hugh W. Drummond, C.M.G., stated that during the past year the company had expended capital to the extent of £50,000 on Waterloo Station, London. He remarked, "A third block of new offices has been brought into use on the northern approach to the station, whilst the offices between platforms 15 and 16 are completed and already partially occupied. The last stage of the building is now well in hand, and, we hope, will go far towards completion during this year. In connection with the work of the entrance to the station in York Road, we intend to design a war memorial, which, I venture to think, will be dignified, beautiful, and fitting as a memorial to those of our gallant lads who gave up their lives in the great war. An escalator has been provided from the platform level to the Waterloo and City Railway, and this is much appreciated by our passengers."

* * *

AT the same meeting, the London and South Western Railway Chairman made a suggestion that, in order to relieve pressure at rush hours, big employers of labour in London should, in conjunction with their workers, so alter the periods of commencing and finishing work as to enable the rush hours to be spread. He added, "We are doing so ourselves, and this represents two trainloads. Six hundred of our clerks now arrive earlier, and are able to leave earlier, and I hope others will be able to follow us in that direction."

IN the Parliamentary Bill which the Corporation of Bristol is promoting to obtain powers for the provision of new roads in the Bristol district, the matter which particularly affects the railways is a projected new road and tramway between Bristol and Avonmouth, to be constructed partly on the site of the Holwells branch of the Bristol Port and Pier Railway, which is owned jointly by the Great Western and Midland Railways. It has been agreed that the site of this short piece of line may be given up to the corporation for the purpose, in consideration of the payment to the joint companies of a sum of £30,000. The permanent way material will be retained by the joint companies. The Bill, as submitted, will need certain amendments, to give effect to the arrangement, and to properly protect the interests of the railways concerned.

* * *

CAPITAL expenditure required by the London and North Western Railway during 1920 embraces £150,000 on the widening of the line between Chalk Farm and Willesden for the electric service, and it is in the interest of the company that that work should be proceeded with and completed as early as possible to provide for the increased traffic which may certainly be expected in the future. It includes also £225,000 under the head of steamboats—two of the four Irish cross-Channel steamers which were taken over by the Government during the war were lost, and have to be replaced; the replacements were commenced in 1915. Other large sums are for additional wagons, which are badly needed, and for new electric trains, without which the company cannot establish the full service between London and Watford, and for which the contracts were let before the war. Another item, £175,000, is for additional accommodation at Crewe, Wolverton and Earlestown works.

* * *

AT the March meeting of the Bath City Council a communication was read from the Great Western Railway Company with regard to the proposed re-opening of the passenger station at Twerton, a working-class suburb a mile west of Bath. The station was closed in April, 1917, as a war-time measure of economy. The Great Western authorities have replied to further representations by the Corporation that the cost of renovating the station prior to re-opening would be some £1,200. Wages of staff would involve a further £400 a year. When the station was closed the receipts from passenger and parcel traffic did not much exceed £1,000 a year, and this traffic was now obtainable from the Bath Station

Digitized by Google

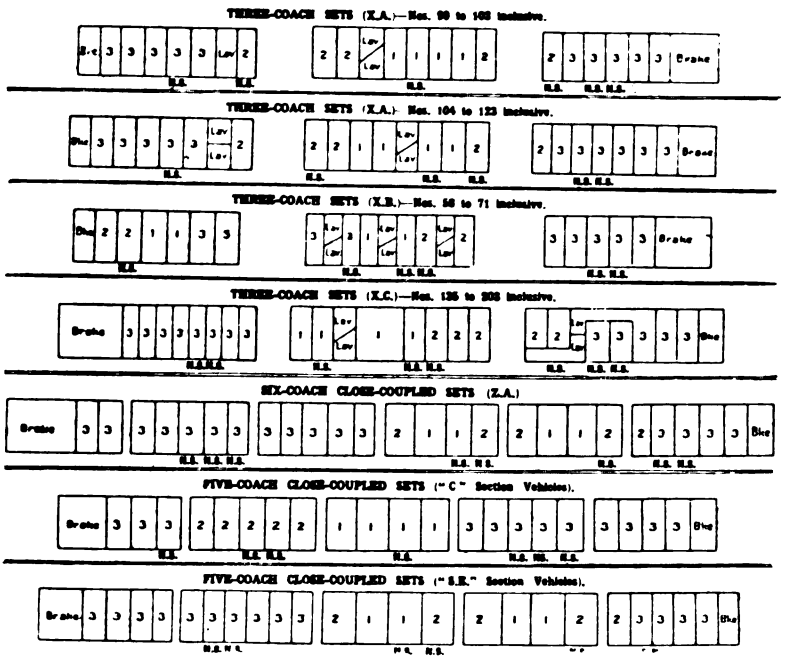
without any additional expense. Further, the traffic had steadily declined since the opening of the Bath Electric Tramway Company's service in 1904. The Bath Corporation, however, intend to continue their application for the re-opening of the station. Appeals will probably be made to the Board of Trade or the Ministry of Transport.

* * *

THERE has been much public interest taken in the innovation in British railway practice adopted by the South Eastern and Chatham Railway on and from March 1, in regard to smoking in passenger carriages. On the Continent it has always been the rule to label those compartments in which smoking was not allowed, and this is the method now in operation on the South Eastern and Chatham system. Passengers may now smoke in any compartment that is not labelled "non-smoking." The change has been made with absolute smoothness and the travelling public has fallen in with the arrangement as though to the manner born. Mr. E. C. Cox, Superintendent of the Line, South Eastern and Chatham Railway, is to be congratulated upon the success of his pre-concerted plans. By his courtesy the RAILWAY MAGAZINE is able to illustrate on this page diagrams showing the method of allocating non-smoking compartments. Doubtless the marked advantages of the change and its successful innovation on this line will cause the new practice to be adopted generally on British railways.

* * *

SINCE war began in 1914 no fewer than 4,000 traders' wagons have disappeared from the Caledonian Railway system. This shortage is one for which the railway company is in no way responsible. Having been continually threatened with compulsory expropriation or compulsory hiring of their wagons, traders have naturally refrained from replacing wagons which have been worn out. As long as the present uncertainty continues this process of reduction of traders' wagon stock will also continue.



DIAGRAMS SHOWING METHOD OF ALLOCATING NON-SMOKING COMPARTMENTS IN SOUTH EASTERN & CHATHAM RAILWAY TRAINS.

* * *

FISH has ever been an important traffic to the Great North of Scotland Railway. During June, July, August and September, 1919, this company ran 432 special fish trains, with a corresponding number of empty plant trains, conveying 8,469 trucks carrying 24,052 tons of fish. During the first three months of the same year the local white fishing was considerably augmented by cargoes of herrings from Norway being landed at ports in the "Great North" area for despatch to southern markets. During that

Digitized by Google

period they ran 134 special trains with 3,639 trucks carrying 9,339 tons of fish. For the whole 12 months the fish carried by passenger trains represented a gross weight of 42,081 tons—an increase over the 1913 figures of about 35,000 tons. For this enormous fish traffic it had been most difficult to get an adequate supply of suitable fish plant, the company's own stock meeting only a fraction of the requirements. The greater proportion of the vehicles during the busy season were supplied by the southern railways.

* * *

DURING the year 1919 outlay by the Great North of Scotland Railway on capital account was £13,764, almost entirely on sidings and works at stations. The company will have to widen, during the current year, the portion of the Buchan section between Parkhill and Elrick, the cost being estimated at £25,400. The Buchan section between Dyce and Maud is a very busy one, especially in summer time during the fishing season, and in order to facilitate the working of the line, which is a single one, it is thought it ought ultimately to be doubled from Dyce to Ellon, a distance of 13 miles.

* * *

BY the Great Southern and Western Railway, Ireland, no new engines or tenders were turned out during the year 1919. Two new Post Office vans were constructed, and 66 new wagons, while 1,997 wagons received heavy repairs. During the year the wagon makers were out on strike from September 17 to November 15, owing to a society dispute among themselves. The work in the locomotive department during the year 1919 was seriously interrupted owing to strikes and shortage of material. In order that the renewal of the rolling-stock should, as far as possible, be brought up to the standard programme, six new engines and 260 wagons were ordered from outside contractors, and it is hoped there will be built at Inchicore 200 new wagons during the year 1920

* * *

BY Mr. J. Bond, 24, Royds Street, Rochdale, THE RAILWAY MAGAZINE is informed that a Lancashire branch of the Stephenson Locomotive Society has been established, and he asks locomotive enthusiasts in the County Palatine to communicate with him, as he has accepted the local secretaryship.

* * *

ON page 211 of the March RAILWAY MAGAZINE there appeared an illustration of No. 16, *Stanhope*, a six-coupled engine of the Stockton and Darlington Railway. Concerning this locomotive Mr. John Kitching writes:—"I should like to correct the statement that 'probably it was supplied in 1831.' The actual date was 1845, and this is so stated in the Stockton and Darlington Railway's official list of locomotives. No. 16 was delivered to the railway company some months earlier than No. 25, *Derwent*, both being built in the same year by Messrs. William and Alfred Kitching at the old Hope Town Engine Works, Darlington. They were the two most powerful locomotives the railway company possessed. No. 25 regularly took a double load up the Crook incline, 1 in 45, which was considered a wonderful feat. Shortly after being handed over to the railway company, it ran through coal trains between Shildon and York. At that time the York and North Midland line was not amalgamated with the York, Newcastle and Berwick, although there was close correspondence with it. Thus the engines from the North handed traffic at York to the York and North Midland Railway, which conveyed it to Normanton, Leeds and Hull. I ought to add that the two engines were alike, and those who have examined the *Derwent* at Darlington station will understand the type."

* * *

WITH reference to the reply last month in the "Why and Wherefore" column to J. S. C. and "Barrymore," Mr. L. B. Hewitt writes "I have noticed that, as was to be expected, the same classification discs have been allotted to the standard Great Western 'Consolidation' type and to the R.O.D. engines. I recently saw one of the latter in service bearing the number '1975' on what appeared to be a cast-iron number-plate, in place of the expected Great Western number in the '3000' series."

* * *

By the installation, at Neasden Works, of an electrically-operated wagon tipper, which enables the rapid handling of coal and quick release of much needed wagons, the Metropolitan Railway has added a further link in the chain of power house efficiency.

* * *

To advertise the Gleneagles Golf Course, which has been laid out by Braid in collaboration with Captain Cecil K. Hutchison, a striking colour poster, from a sketch by Harry Rountree, is about to be displayed broadcast throughout the country and in America. Gleneagles being in the Strathearn district of Perthshire, and situated 14 miles from Perth, and served by the Caledonian Railway, is on the threshold of the highlands—in "the very he'rt o' Scotland"—and the golf course there has been described

Digitized by Google

as unsurpassed alike for play and the splendour of the scenic surroundings. Gleneagles, *inter alia*, is to be the venue, in May of this year, of the *Glasgow Herald* six-day Professional and Amateur Golf Tournament —open to the world's players—which may be described as being amongst the most important that has ever been held in Great Britain, or, indeed, in any country, inasmuch as over £700 will be distributed in prize-money.

* * *

THE Shakespeare Festival at Stratford-on-Avon will be held from April 19 to May 8, when the following plays will be produced under the direction of Mr. Bridges Adams :—" Richard II," " Taming of the Shrew," " Much Ado about Nothing," " Cymbeline," " Hamlet," and " The Merchant of Venice." Stratford-on-Avon is not only the Mecca for lovers of Shakespeare, but to anyone who cares for an outdoor life or is fond of outdoor sport, Stratford-on-Avon offers exceptional facilities, with the added charms of delightful scenery. Hunting, boating, fishing, golf, bowling, cricket, tennis—each and every kind of sport is provided for. As will be seen from our advertising columns, a beautifully-illustrated guide to Stratford-on-Avon and district can be obtained on application to Mr. A. E. Diggins, General Manager of the Stratford-upon-Avon and Midland Junction Railway, Stratford-on-Avon.

" IN 1914 a penny took you 1½ miles. To-day a penny takes you 1¼ miles. There's the rub." The foregoing is a quotation from a poster recently exhibited on the London Underground Railways. It also gives particulars of the cost of upkeep, thus :—

	1914.			1920.		
	£	s.	d.	£	s.	d.
Coal, per ton ..	0	14	11¾	2	2	5
Steel rails, per ton	7	0	0	20	7	6
Bar iron, per ton ..	7	15	0	28	0	0
Lubricating oil, per gallon	0	1	5	0	3	7

* * *

THE London " Safety First " Council is performing admirable work, and has recently held its third annual meeting. The Railway " Safety " Committee includes Messrs. G. H. Dennis, E. Falconer, W Holt, F. W. Hopper, J. P. Thomas, J. Thornton, and G. F. Thurston.

* * *

RAILWAY MAGAZINE readers may like to know that Messrs. Vernon Smith and Sons, Limited, 117–123, High Road, Chiswick, experts in model locomotives and engines of all descriptions, are concerned in manufacturing and repairing gas and oil engines, and they are further extending their workshops for coping with the enormous number of inquiries concerning motor cycles and motor cars for the season now beginning.

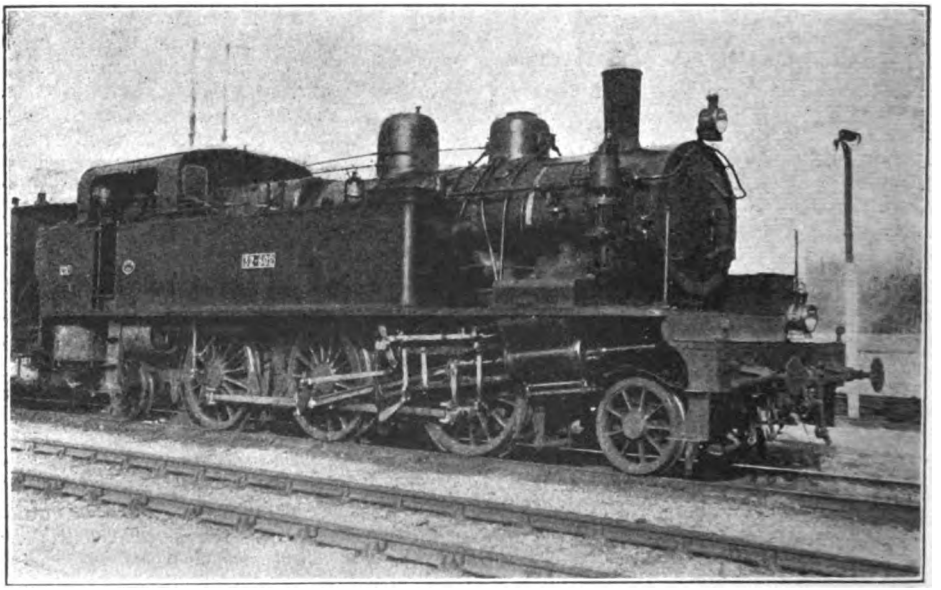


Photo.] **OUEST-ETAT RAILWAY OF FRANCE.** [*W. H C. Kelland.*

2-6-2 tank engine, No. 32—602 at Poissy.

Digitized by Google

On the Metropolitan Railway a special augmented train service will be provided during Eastertide for the benefit of people wishing to visit the charming countryside served by this system. On Good Friday and Easter Sunday the usual Sunday train service will be run, but one or two earlier trains will be put on for passengers to travel to terminal stations of other lines. On Saturday, April 3rd, the ordinary service will be cancelled and a special one substituted, commencing about 6 a.m. A six-minutes service will be maintained throughout the day on the Circle and Hammersmith line; a five-minutes service will run to Willesden Green; a fifteen-minutes service to Harrow, whilst to Uxbridge trains will run every half-hour. With the exception of a few morning trains cancelled the Aylesbury line will be as usual. On Easter Monday special Bank Holiday trains will be run on the St. John's Wood and Aylesbury line leaving Baker Street for Willesden Green about every five minutes, Neasden, Wembley Park and Harrow every 15 minutes, and Uxbridge every half hour. Trains to the Aylesbury branch will run about every hour.

* * *

A CONSIDERABLE number of railway extensions are at present being made in Queensland, particularly in the northern districts of that progressive Australian State. The line from Cairns down to the North Johnstone at Darajee is completed, as are also the earthworks from Darajee into Innisfail, where the permanent rails and sleepers are being laid. For the present, the rails over this portion are being laid on the 2 ft. gauge, which will allow the Government tramways to operate from Mourilyan to the North Johnstone, until the bridge over the latter river is completed. As regards the bridge in question, it is a big undertaking, and the Department is calling for tenders for the steel girders. A start will soon be made in the building of the bridge piers. This bridge is about 2½ miles from Innisfail. From Innisfail southward towards Cardwell the construction has been started, and men are working from 10 to 12 miles out from Innisfail, in the vicinity of Liverpool Creek. The earthworks are well advanced some 7 or 8 miles, and in progress for a further distance. This portion would be the standard gauge railway, and the Department is pushing it on with the ob ect of getting down to Banyan Creek, in the neighbourhood of the Tully River, for the purpose of enabling cane to be grown for the South Johnstone Mill. At Ingham the rails are now laid from Townsville into the town. Work has also now been started north from Ingham towards Cardwell. The main camp is now being shifted from Rollingstone to a poin two miles north of Ingham, and men are now actually at work on that section. Altogether, work is proceeding at seven different points on the North Coast line. The progress of the line generally has been much hindered by the shipping strike, preventing the getting forward of material, such as cement, &c. The rails for the line are being obtained under contrac from the Broken Hill Company at their works at Newcastle, and the last lot of rails used on the Ingham section has been rolled at Newcastle.

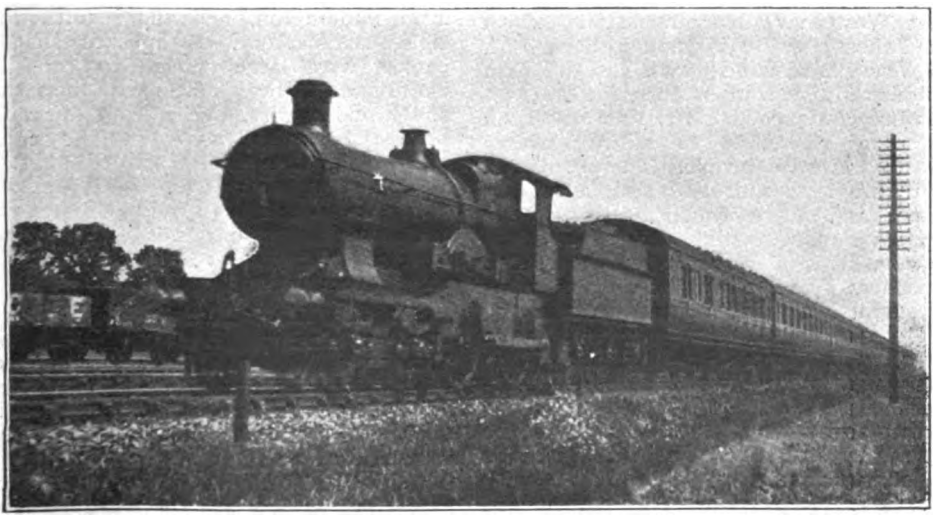
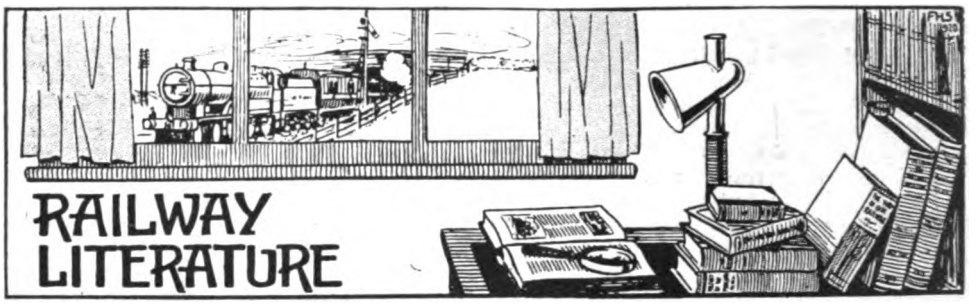


Photo.] GREAT WESTERN RAILWAY. [*J. F. Dearden.*

Paddington—Worcester express 4-4-0 engine No. 4158, "Petunia."

Digitized by Google



SEEN FROM THE RAILWAY PLATFORM By William Vincent. [T. Fisher Unwin, Ltd., Adelphi Terrace, London.] Price, 3s. 6d. net.

In this book, Mr. William Vincent, who has seen 47 years' service with the great railway bookstall firm of W. H. Smith and Son, has placed on record a remarkable series of experiences and reminiscences. Mr. Vincent began bookstall life in 1859, on the South Wales Railway. His first employers were Horace Marshall & Son. That well-known firm, the head of which was Lord Mayor of London, 1918-9, was in the fifties, the leaseholders of the stalls on the South Wales line. In 1863 W. H. Smith & Son leased the bookstalls on the Bristol and Exeter Railway, and in 1864, Mr. Vincent was placed in charge of the stall at Tiverton. His subsequent service as a bookstall manager included Didcot, Taunton, Swansea, Reading and Euston (London). In 1903 Mr. Vincent was promoted to the position of superintendent of the railway bookstalls in Wales, and it was during his occupancy of this office, W. H. Smith & Son lost the contracts for the London and North Western and Great Western Railway bookstalls, which were taken over by Wyman & Sons, Ltd. Mr. Vincent remained with his old firm until his retirement in October, 1908.

As may be expected, Mr. Vincent's book has many references to railway events and to railway people. The bookstall, is the brightest spot on many a railway station, and it is usually, although not always, a good point for observation. Anyway, it is a place to which a large proportion of the railway passengers gravitate, and Mr. Vincent has entertaining anecdotes to tell of all sorts of people with whom he has come into contact. They range practically from Dukes to debt-collectors.

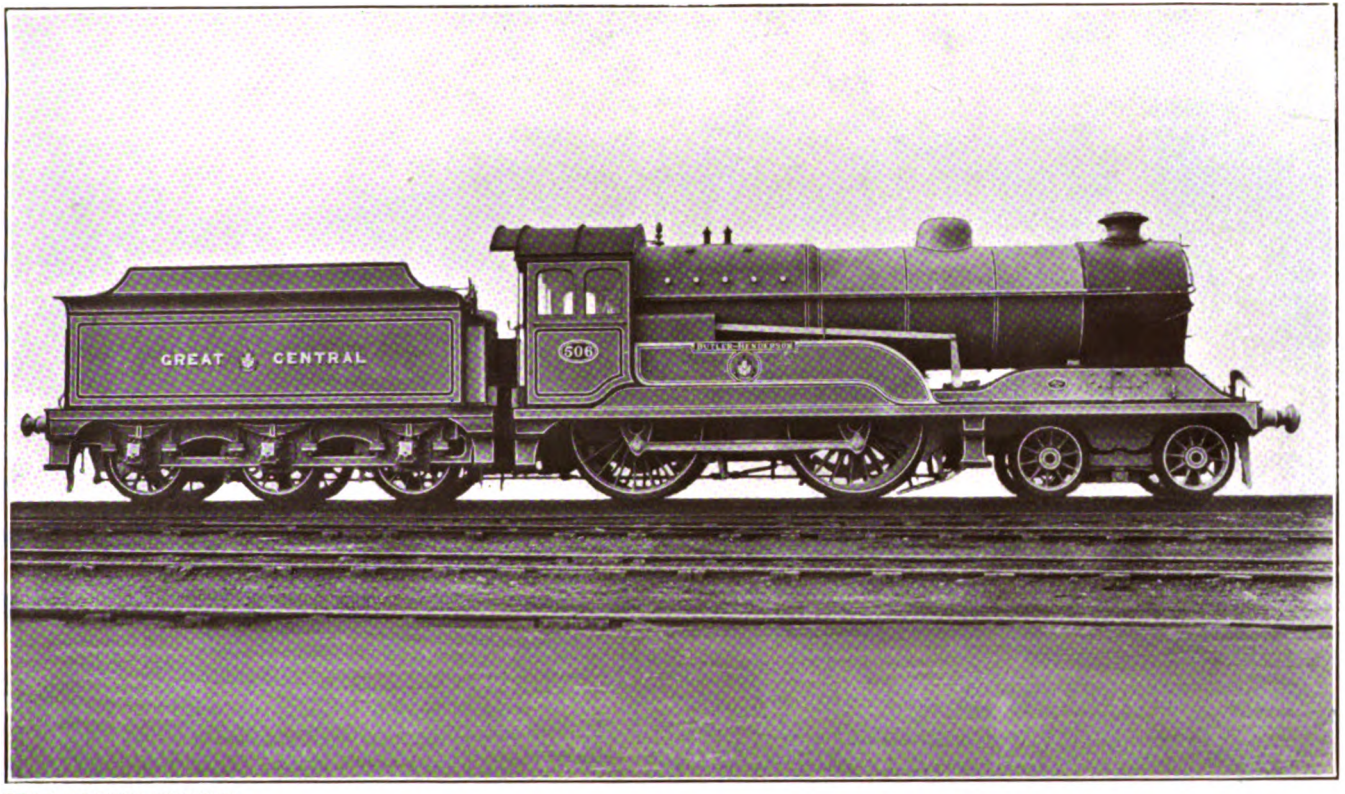
RAILWAY MAGAZINE readers will be particularly interested in Mr. Vincent's recollections of railway working in the early days, and his records of improvements. His descriptions of life at country stations are full of live interest. In some cases the author has not got his facts in correct chronological order, but as he has written from memory and admits it, much may be forgiven. Anyway, Mr. Vincent has produced an exceedingly readable book, and one that is remarkable in many respects.

Among the railway reminiscences in his book, Mr. Vincent includes an account of certain accelerations of passenger trains in the mid-seventies, which secured earlier delivery in the provinces of the London newspapers. He remarks, "The daily papers arrived at Swansea a little after four o'clock in the afternoon by the old 6 a.m. out of Paddington, taking over ten hours on the way to do the barely 200 miles journey. Just at that period the London and North Western Railway accelerated their service, and it was possible by working the changes and connections at Stafford and Shrewsbury to get the parcels at Swansea by three o'clock. The bookstall manager, who supplied about 40 newsagents in Swansea town and neighbourhood, thereupon arranged with his London head office to forward the consignment from Euston via Stafford and Shrewsbury, instead of from Paddington, and the result proved highly satisfactory. It appears that the parcels were large enough to cause the Paddington railway officials to miss them, and wonder why. Very soon after, the Great Western Railway rose to the occasion and the London dailies arrived at 1.30—a great improvement upon 4.15. So we were glad to return to the old direct route and compliment our railway friends on their consideration of the needs of an important community."

SWANSEA TIME-TABLE.—Issued by the Swansea Harbour Trust as the Official Handbook, the 1920 edition contains useful information concerning the port and trade of Swansea, with complete descriptions of the docks and shipping facilities, railway connections, and the shipping and trade of the port. Many illustrations and much useful information are combined with tide tables and other data.

Digitized by Google

Digitized by Google

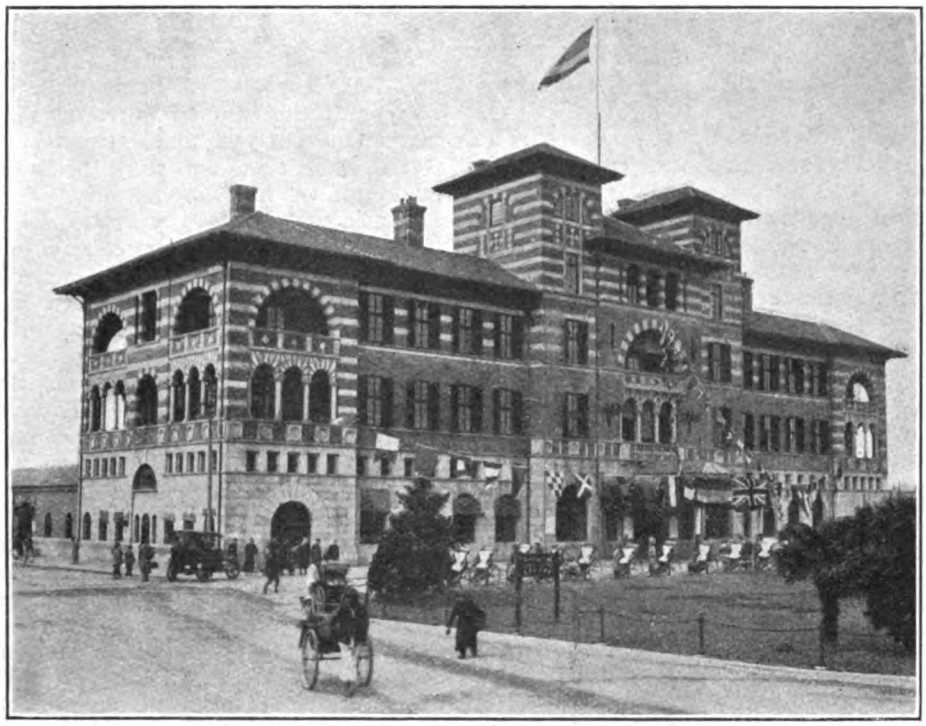


GREAT CENTRAL RAILWAY 4-4-0 SUPERHEATER EXPRESS LOCOMOTIVE No. 506 "BUTLER-HENDERSON."

Mr. J. G. ROBINSON, C.B.E., Chief Mechanical Engineer.

Cylinders, 20 in. by 26 in. Coupled Wheels, 6 ft. 9 in. diam. Steam Pressure, 180 lb. per sq. in.
Heating Surface: Tubes (large), 416 sq. ft.; Tubes (small), 972 sq. ft.; Firebox, 155 sq. ft.;
Superheater (Robinson type), 209 sq. ft.; Grate Area, 26 sq. ft.
Weight in working order: Engine, 61 tons 3 cwt.; Tender, 48 tons 6 cwt.; Total, 109 tons 9 cwt.

Digitized by Google



SHANGHAI NORTH STATION AND HEAD OFFICES.

The Shanghai-Nanking Line.

CHINESE GOVERNMENT RAILWAYS. [No I.]

By C. L. G. WAYNE and C. L. W. BAILEY.

TRANSPORTATION is the life-blood of commerce, and realising the economic possibilities of railways, and their absolute economic necessity, there is evidence to show that China has awakened within recent years to the conviction that if she intends that her vast natural and material resources shall be realised, her development is dependent upon the construction and successful operation of railways.

The history of railways in China, whilst comparatively modern, is most interesting, and volumes could be written on the subject; it is our purpose here, however, to give a short description of one section only, and that is the Shanghai-Nanking Railway, a line which brings into communication several important and populous towns and cities of Kiangsu Province and forms one of the links—we might say the first link—in the railway chain connecting the old with the new world by way of the great Trans-Siberian route.

It may be interesting to mention first of all that the branch line from Shanghai to Woosung, 10 miles in length, has the distinction of being the first railway to be built in China. It was opened as a narrow gauge line so long ago as 1876, and ran successfully for some months until native opposition proved too strong, and to avoid trouble it had to be closed. It was reopened later, on the understanding that the Government would take it over from the proprietors, but immediately the purchase was completed the line was abandoned, all the materials were taken up, and, together with the

Digitized by Google

engines and rolling-stock, shipped to Formosa, where they were left lying on the beach to rust away. The present railway between these two places is of standard gauge, and was completed in 1898.

With regard to the main line from Shanghai to Nanking, it was just twenty years ago that the preliminary agreement for the acquisition of a loan for the construction of the railway was signed in Shanghai by His Excellency Sheng Kung-Pao (then Sheng Hsuan-Huai), the Director-General of the Imperial Chinese Railway Administration, and Messrs. Jardine, Matheson and Company, and the Hongkong and Shanghai Banking Corporation, as Joint Agents representing the British and Chinese Corporation.

Four-and-a-half-years elapsed before an Imperial Decree was issued, under the authority of which a final Agreement was executed by the parties named on the 9th day of July, 1904. This document provided for the issue of a sterling loan for an amount not exceeding £3,250,000 secured by Imperial Chinese Bonds, with the railway as first mortgage security. The price agreed upon for the loan was ninety per centum of the nominal value of the bonds, which bear interest at the rate of five per cent. per annum on their nominal value. The duration of the loan was fixed at 50 years, commencing from the date of the ratification of the Agreement, but provisions are included under certain conditions for the redemption of the loan after 12½ years, and at par after 25 years.

The amount of the loan was based on the preliminary surveys and estimates which had been prepared by the Consulting Engineers, the late Sir John Wolfe Barry, the late Gabriel James Morrison, and A. J. Barry, M.Inst. C.E. It included provision for payment of interest out of capital during construction, Taels 1,000,000, representing the agreed purchase price of the existing Shanghai-Woosung line, and the sum of £250,000 for the acquisition of land by the Chinese Administration for a double line of railway for the whole distance and for the construction and equipment, as economically as possible, in accordance with the best modern system, of the line of railway from Shanghai to Nanking.

In the meantime, a staff of engineers had been engaged in England in July, 1903, and the summer of 1904 saw the permanent surveys and estimates completed, constructional work being commenced in the following autumn.

Considerable delays were experienced in the initial stages, particularly in the acquisition of the necessary lands, but matters in this respect improved in the spring of 1905, and on April 25 of that year the ceremony of cutting the first sod was performed by H. E. Sheng Hsuan-Huai at Shanghai. Those who witnessed this sod cutting ceremony would certainly fail to recognise the locality to-day. In place of the then existing swamp there now stands a fine and commodious station with extensive sidings, warehouses, and other accommodation, the main building being of handsome architectural design.

Work on the section of line from Shanghai to Wusih, a distance of 80 miles, was first taken in hand together with some of the heavier work on the Chinkiang-Nanking section, including the tunnel at and the deep cuttings in the vicinity of Chinkiang.

The preparatory examination of the country had revealed the fact that to avoid interference with the almost countless graves and houses would absolutely ruin the general alignment, and consequently render nugatory all ultimate prospects of economical operation and fast running. It was wisely decided, therefore, to lay out the longest straights possible, not only for the sake of directness but also with a view to reducing first cost of construction and future cost of maintenance and operation; but slight deviations were made at certain places to avoid interference with Ancestral Halls, Tombs and Monuments.

The benefit of such a policy will be readily conceived when it is stated that the ruling gradient is 1 in 200 of which, however, there is only 5.64 miles, and no fewer than 128 miles of the line are easier than 1 in 1,000. Of curves there are 59 between Shanghai and Nanking, with an aggregate length of 19.8 miles only. The sharpest curves are 3 deg. but there are only two of these, totalling 4,180 ft. in length.

From Shanghai to Tanyang, a distance

Digitized by Google

of 132 miles, the line crosses highly cultivated land of the Yangtse Valley, intersected with innumerable canals and creeks, and in no other part of China, perhaps, is it possible to obtain a better conception of the agricultural resources of the vast republic. After leaving the latter city, the contour changes, and the line traverses an undulating and rising country until it reaches a ridge or water-shed at mile 144, whence it descends on easy gradients, through heavy cuttings and a tunnel through the Fort Hill to Chinkiang.

From Chinkiang the alignment follows the foot of the hills as far as Lungtan, thus avoiding the outer country which is subject to periodical inundations. The scenery along this stretch of line is perhaps the most interesting on the railway; on one side are the hills and on the other are picturesque rice fields with here and there a lonely farm.

The terminus at Nanking, a distance of a little over 193 miles from Shanghai, is on the south bank of the Yangtze River. The site prior to the advent of the railway was low swampy ground subject to annual inundations, and a great deal of filling had to be done.

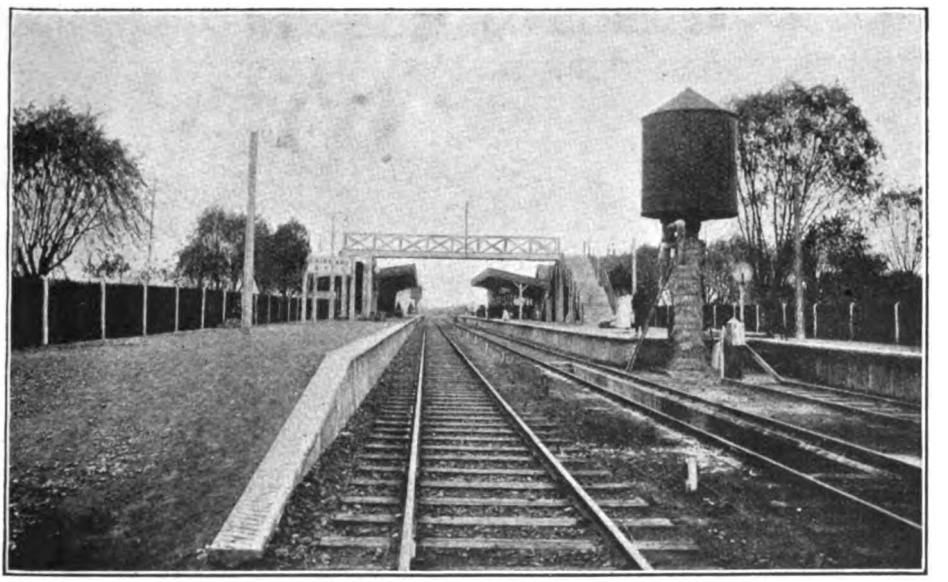
Quite a feature of the line from an engineering point of view is the number of bridges and culverts which were rendered necessary by the numerous waterways which had to be crossed. There are no fewer than 303 bridges and 405 culverts between Shanghai and Nanking.

Tunnels are always objectionable from a railwayman's point of view, and Chinese railways, as a whole, may be regarded as fortunate in this respect. The only one on the Shanghai-Nanking Railway is situated at Chinkiang. The length from face to face is 1,320 ft., and provision was made for the laying of a double line of rails.

Endeavours were made to avoid a tunnel altogether, but it was proved conclusively that it was quite impossible otherwise to approach the City of Chinkiang except on a back shunt, the additional cost of which would more than have exceeded the cost of the tunnel, apart from other more permanent objections.

A medal was struck to commemorate the laying of the foundation of the tunnel on September 1, 1905, and the first engine ran through on February 27, 1908.

It is worthy of record that the whole of the excavation and brickwork in the tunnel was carried out by Chinese labour, under European supervision, and during the construction not one single fatal



CHINKIANG STATION, MAIN LINE.

Digitized by Google

accident occurred, this, we believe, being quite an exception in tunnel work, even where trained workmen are available.

Earthworks generally, presented little difficulty, except at mile 60, where the embankment had to be laid across a marsh continually under water, and at Nanking, as previously mentioned.

Permanent way consists of 85· lb. flat footed steel rails 36 ft. long. The main line sleepers are of Jarrah 9 ft. by 10 in. by 5 in., spaced 14 to a 36 ft. rail, or 2,060 per mile. The sleepers of sidings are of the same wood, 8 ft. 9 in. by 9 in. by 5 in., spaced at 3 ft. centres, or 1,760 per mile. The line is ballasted throughout with bottom ballast of stones of 12 in. by 6 in. by 8 in. hand packed; the top ballast consisting of stones broken to pass a 2 in. ring.

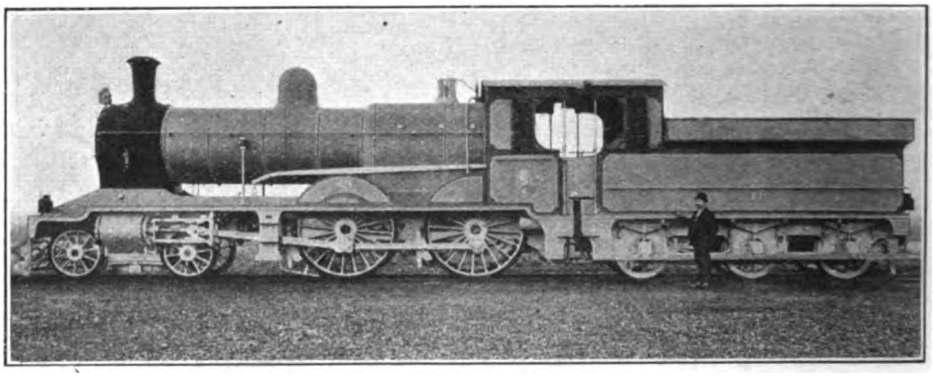
By agreement with the Imperial Chinese Telegraph Administration, the main line of posts and wires to Nanking was constructed by that Administration in the latter part of the year 1905 and early in 1906, the railway paying a proportionate cost of the total according to the number of wires. Five years later, however, the railway erected a separate line of posts for their own wires.

The telegraph instruments used are open-circuit Morse inkwriters, P.O. galvanometers, 4-line lightning conductors, and 4-line commutators, the batteries being Leclanché.

To obtain suitable materials for the construction of the railway was a difficult task. As much as possible was obtained locally, though this was chiefly confined to earth, sand, stone, granite, and bricks. In carrying out the work every possible effort was made to standardise details and working parts.

Construction of the railway was carried out departmentally, under the supervision of an Executive Engineer, with Assistant Engineers in charge of sub-divisions. The greater part of the work was let to Chinese contractors at scheduled rates, and the erection of the bridges was carried out entirely by Chinese labour, under European supervision.

The locomotive erecting and carriage building workshops are situated at Woosung, about eight miles from Shanghai, on the left bank of the Whangpoo River, where the railway possesses extensive water frontage.



4-4-0 LOCOMOTIVE OF CLASS "C."

Built by Robert Stephenson & Co., Ltd.

The erecting shop has four lines of pits, and one through road for materials. Adjoining this are the machine, smith, and boiler shops, the power house and the boiler house. The machine shop is equipped with modern machinery, electrically driven. The foundry has an area of 3,200 sq. ft. In addition there is a saw-mill, a carriage repair and paint shop, carriage building shop and the usual stores. A laboratory is in course of erection. Two 20-ton electrically-driven cranes traverse the entire length of the erecting, boiler and machine shops, and an 18-ton travelling crane is provided in the carriage repair shop. The offices of the Locomotive Superintendent and his staff adjoin the shops.

Digitized by Google

There are five stations on the Woosung branch line. Ample warehouse accommodation and facilities have been provided at Woosung on the river front adjoining the railway workshops for dealing with ocean shipment cargo. Between Shanghai and Nanking there are 42 stations, and a brief description of the principal ones follows.

The station at Shanghai North is one of some pretensions. There is a spacious booking hall, refreshment and waiting rooms, and extensive offices in which is conducted the administration and management of the railway. Perhaps one of the first things to strike the observant passenger is the extent of the covered circulating area, which is much appreciated by the Chinese passengers. The station was enlarged and remodelled in December, 1916, to provide for the advent of the Shanghai - Hangchow - Ningpo Railway trains.

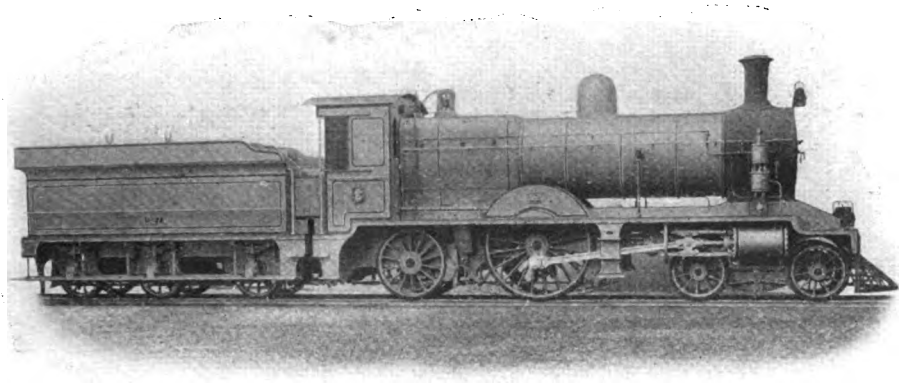
Woosung line trains are accommodated on the east side of the station, where separate booking offices and waiting rooms, with a platform having direct access to the roadway, have been provided.

There are five main line platforms. Four of these form bays, with middle roads for the release of engines. The fifth has a through road to the Woosung branch.

Fourth class or Coolie passengers are kept separate from the other classes as far as possible, and the booking offices for these are situated on the west side of the main station adjoining, but quite distinct from the baggage offices. The simplest design possible was adopted for the baggage offices, as indeed, for all the arrangements for the comfort and convenience of passengers.

Shanghai North Main Line signal box is situated a short distance away from the ends of the platforms, and contains the electric staff instruments and the levers for operating signals controlling Shanghai-Nanking Railway and Shanghai - Hangchow - Ningpo Railway trains. All the signals are interlocked and are electrically lighted.

Along the western side of the passenger station and adjoining the public road, is an extensive godown (warehouse), capable of accommodating 144 thirty-ton wagon loads.



4-2-2 LOCOMOTIVE OF CLASS "D."

Built by Kerr Stuart & Co., Ltd.

A locomotive running shed is situated on the extreme west of the station, and has accommodation for 12 main - line engines. There is a machine shop attached for executing minor repairs. On the opposite side of the two main lines are four cast-iron water tanks of 10,000 gallons capacity. An additional shed on similar lines has been provided for the accommodation of Shanghai-Hangchow-Ningpo Railway engines.

Between the engine shed and the carriage shed is the electric power house, including boiler and engine house. Two Penman Lancashire Boilers supply steam to two 85 K.W. compound Belliss engines

Digitized by Google

running at 425 r.p.m. each, direct coupled to an E.C.C. compound wound interpole dynamo generating at a pressure of 440 to 460 volts.

The whole of the approach roads, offices, platforms and signals at Shanghai North and the Goods Depôt at Markham Road are illuminated by electricity, generated here.

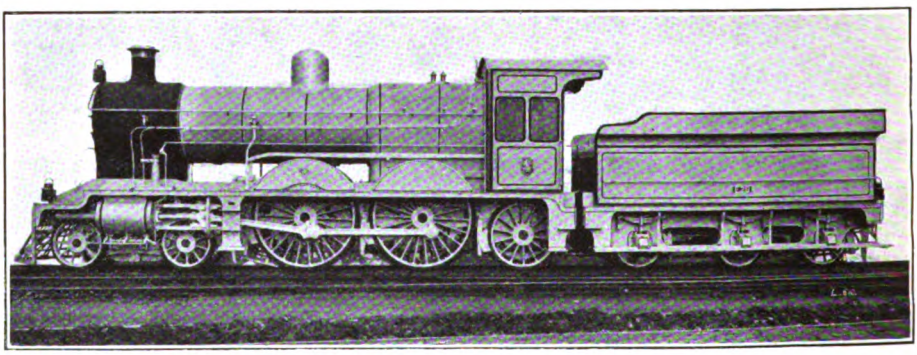
About a mile from Shanghai North is Markham Road Goods Station, which may be termed the rail goods depôt for the Treaty Port of Shanghai. It is situated on the Soochow Creek which runs through the heart of the International Settlement, and has two docks alongside which are extensive godowns and sidings for dealing with the traffic of both the Shanghai-Nanking and Shanghai-Hangchow-Ningpo Railways.

At Nansiang, Kunshan and Weiting there is siding and godown accommodation.

At Soochow the railway has rail access to the Grand Canal, and a fair goods traffic is dealt with. Before the 1911 revolution, Soochow was an official centre of considerable importance.

Wusih has made rapid strides within the last decade. It is the centre of the great silk industry, the surrounding, country being one immense mulberry plantation. Here the railway has provided extensive godown and siding accommodation to cope with the general and special cocoon traffic. The latter, which is at its height in June, taxes the facilities of the railway to the utmost.

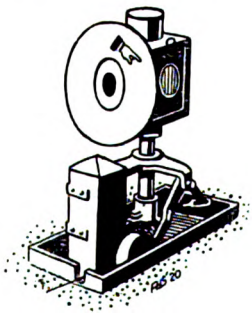
Changchow, a great trading centre, is a little more than half way to Nanking. Changchow is the hub of the line in the night, and is the principal engine-changing station. There is a large engine shed with facilities for minor repairs, and the usual coaling and watering facilities. A fair goods and livestock traffic is dealt with, for which siding and godown accommodation have been provided.



4-4-2 LOCOMOTIVE OF CLASS "E."

Built by North British Locomotive Co., Ltd.

(To be continued.)



Digitized by Google

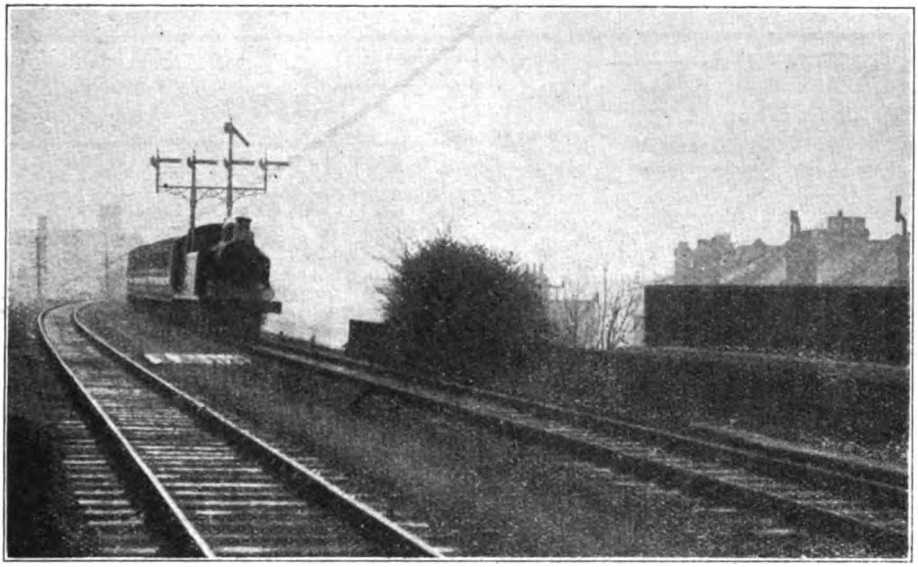


Photo.] [*J. F. Gairns.*

"FOOTBALL SPECIAL" (L.B. & S.C.R. ENGINE AND STOCK) APPROACHING BATTERSEA.

Showing quadruple "distant" signals (of equal height), under "home" signal, to the Latchmere Junction splitting signals.

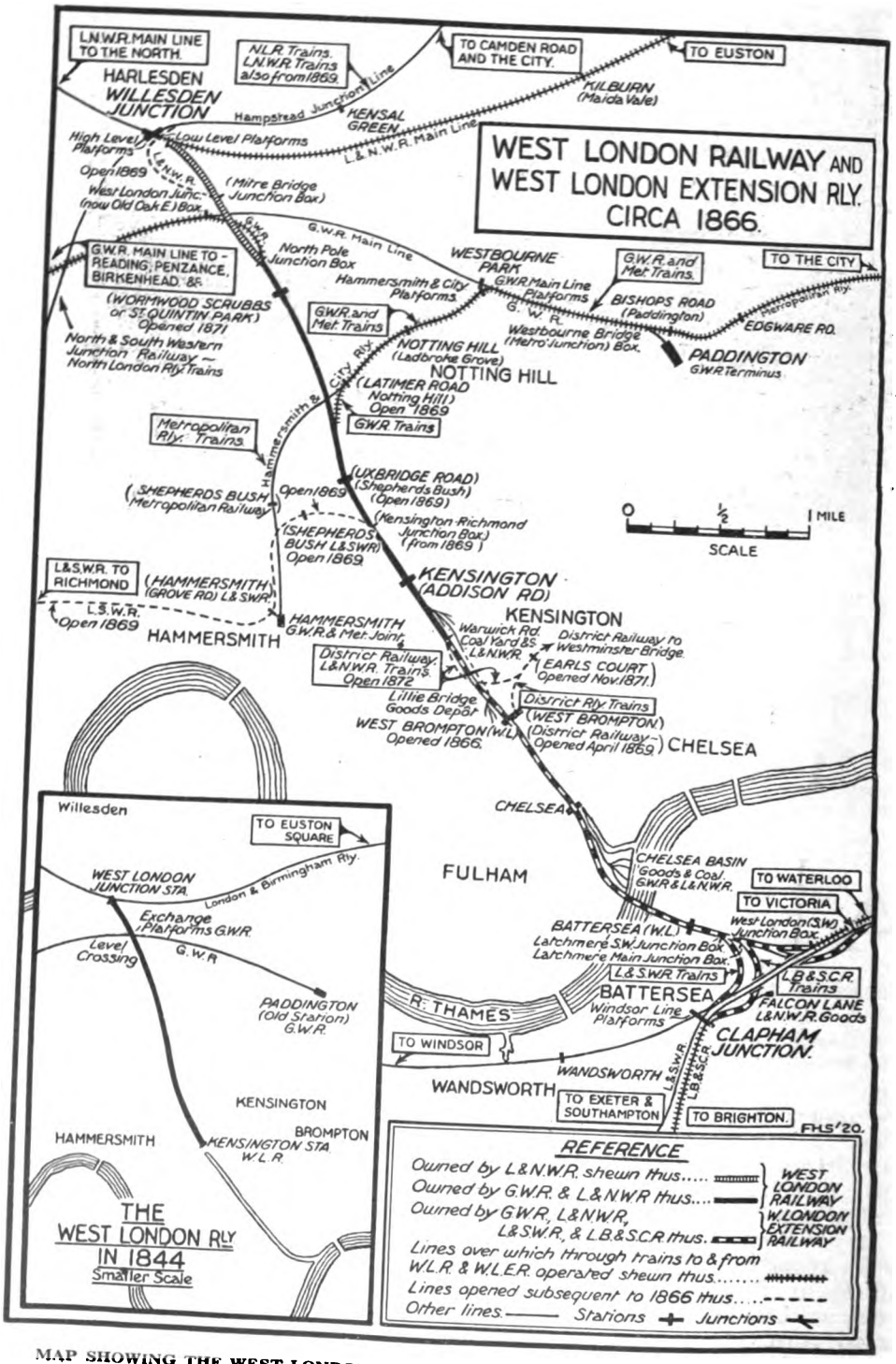
The West London and West London Extension Railways. [No. II.]

By W. J. SCOTT, B.A., A.M.S.E., &c.

AT first the broad-gauge metals, prolonged into Victoria terminus, were unused (except as between West London Junction G.W., and Chelsea Basin, by one coal train each way daily). But before the end of '63, there were *three* broad-gauge trains running to and from Victoria, of which one up came through from Reading (it was a semi-fast), and one down ran to Windsor. Next year (1864) a more interesting development was attempted; a Bristol express due into Paddington at 11.15 a.m., took a slip coach at Reading and detached it at "West London Junction" box for Victoria, where it arrived at 11.30. a.m. calling at Kensington only. As at this time two broad-gauge trains from Victoria (11.50 a.m. and 8 p.m.) were picked up by trains from Paddington to Windsor at West London Junction, the latter spot bade fair to become a kind of Great Western "Strawfrank." Some time in this period there was a short-lived quick train from Victoria at 10-40 a.m., which ran non-stop from Ealing to Slough, and at the latter station caught up a stopping one from Paddington (also 10-40 a.m.), and ran coupled with it to Reading and intermediate stations. But these experiments came to naught; unluckily, as the late G. N. Tyrrell once said to the writer: "people don't live in Victoria Station"; wherefore, whatever their destination in London, they preferred to take a cab from Paddington terminus, rather than to avail themselves of any opportunity of getting further into the West End by rail.

The London and North Western scheme for West London services could not be thought complete; even after the opening of Willesden Junction (in 1865-6) trains were still run into Euston from the L.B. & S.C. system, etc., though these trains of necessity called at Willesden Junction,

Digitized by Google



MAP SHOWING THE WEST LONDON RAILWAY IN 1844 AND THE WEST LONDON AND WEST LONDON EXTENSION RAILWAYS IN 1866.

Digitized by Google

as they had to reverse in that station. But the provisional arrangement under which "Harrow" station was used as a suburban junction for Kensington, etc., came to an end. (Though then, as now, 1 to 1½ miles north of the town whose name it still bears officially, no other name than Harrow was applicable at that date, as the quite modern town of Wealdstone did not then exist). Willesden Junction* can hardly be said to have been made (as Clapham Junction no doubt was) specially as an exchange point for the West London line, as it also gave good connexions with the North London trains for the City one way, or Kew and Richmond in the other direction, by means of its high-level platform (being from the outset a two-storied station). It was plainly designed as a principal one, though at first only a few of the London and North Western main line expresses called there, but by 1871 most of the Down ones and nearly all the Ups had Willesden stops, though a few Up ones still called at Chalk Farm to collect tickets, and 2 or 3 St. Alban's trains (including a slow stopping one Up) gave Willesden Junction the go-by.

One cannot hit on a year or a month in which the services of trains over the West London system had settled down into any fixed shape, as the four owning companies, and especially the London and North Western, made daring changes continually. On the whole, perhaps, the latter months of 1869 (when Uxbridge Road Station was open, and when services from lately opened lines brought in new trains from the Great Western and the South Western systems) is as good a date as can be chosen; it will be seen that things had changed much since March, 1863.

With the opening of the Hammersmith and City line in 1864, a new service of Great Western (B.G.) trains came into Addison Road as a terminus, by way of the curve from where Latimer Road Station now stands, on to the West London line, a little north of Uxbridge Road—the station of that name was not then in existence. At first the trains coupled up to or were uncoupled from the Hammersmith ones at the Latimer Road junction-box; a few years later, when the Metropolitan Company, as joint owners, worked all the Hammersmith trains, the Great Western ones ran separately throughout to Moorgate Street from Kensington, and *vice versa*. In 1869 the opening of the Kensington, Hammersmith and Richmond line—joining the West London a little north of Addison Road Station—brought a new service of London and South Western trains in; these ran over the West London Extension, and by the Latchmere, etc., junctions into Waterloo, or over the Chatham and Dover line to Ludgate Hill.

In November, 1869, the various services were as follows:—

London and North Western Railway.—(1) Broad Street to Victoria (L.B. & S.C.) via Willesden High Level and Addison Road, &c., every half hour, 28 or 29 trains each way daily, stopping at all stations except some on the North London main line.

(2) Euston and Kensington, reversing at Willesden Junction (Low Level), with through coaches in many cases to and from Crystal Palace; eight trains each way, of which a few both ways ran between Willesden Junction and Kensington only.

Great Western Railway.—(1) Victoria (L.C. & D.) to Southall and *vice versa*, calling at Addison Road and all other intermediate stations (including Uxbridge Road); 8 trains each way daily.

(2) Moorgate Street and Addison Road via Paddington (Bishop's Road) and Latimer Road; about every half hour; 32 trains each way daily.

London, Brighton and South Coast Railway.—(1) Kensington (Addison Road) and Crystal Palace, passing some stations; 5 trains each way, mostly through trains to Willesden Junction or Euston.

(*a*) (2) Kensington and Clapham Junction (No. 9 platform) shuttle service. (See L. & S.W. service No. 1.)

London and South Western Railway (*a*) (1) Kensington and Clapham Junction (Windsor line side), shuttle service. (The whole number of trains in these services marked (*a*) was about 28 each way; the

* Strictly speaking, the station is not even in the same county as Willesden, being just inside the Londonshire border. But it is close to Harlesden, one of the many neighbourhoods which make up the big urban-district (and Parliamentary borough) of Willesden (Middlesex).

Digitized by Google

tables of that date do not distinguish between the two companies.)

(2) Richmond to Waterloo or Ludgate Hill or *vice versa*, via Kew Gardens, Addison Road, and the West London "Extension," stopping at all stations to Waterloo; 28 trains each way, of which number 14 were to and from Ludgate Hill over the L.C. & D.R. via Latchmere, Longhedge and Factory junctions.

The changes were so many and so quick in those early days that even in the short space of six years (1863 to 1869), one highly interesting service had come into being and vanished again, after sundry interior changes. This was one to and from the South Eastern Railway; it began (in 1866) with 11 trains each way to or from London Bridge (S.E.); a few of these terminated at or started from Kensington, but nearly all worked through to Euston, being hauled by London and North Western engines from Addison Road northwards and *vice versa*. The coaches were mostly those of the South Western, for which reason the first morning train started from Waterloo, and the last at night returned thither to stable. Next year (1867) Cannon Street took the place of London Bridge, while about half the trains then stopped short at Willesden Junction (instead of Euston); by February of 1868 the whole service had stopped altogether. While it lasted it brought London and South Western coaches into Willesden Junction, and—so far as one's memory can be trusted—South Eastern vehicles (one set only) on to the West London line. The "New Waterloo" of the 1867 tables meant the platforms on the connecting spur between the L. & S.W. and S.E. railways, which recent works at Waterloo terminus have blotted out; these platforms, though just beyond the terminus itself, were on South Western ground, and quite apart from the "Waterloo Junction" station of the South Eastern Company, opened about 1869.

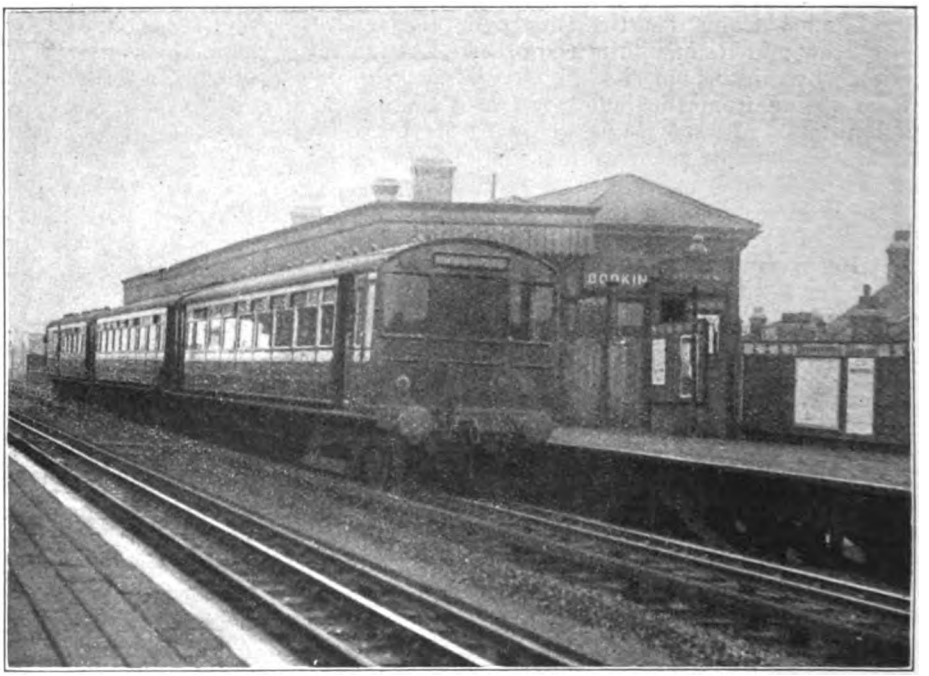


Photo.] [*J. F. Gairns.*

L. & N.W.R. ELECTRIC TRAIN AT ST. QUINTIN PARK AND WORMWOOD SCRUBS STATION.

It is curious that the Euston service should have lingered so long, since the number of main line stops—all Up trains and nearly all Down ones—at Willesden

Digitized by Google

quite put an end to any need of travelling in and out of Euston for main line connections. Even as late as 1875 there were four through trains from Euston to Crystal Palace; that, however, seems about the latest year that such trains ran. The Broad Street trains* were diverted on to the District system at Earl's Court junction-box by 1872, running to and from Mansion House; the horseshoe-shaped route thus formed was known as "the Outer Circle," though at the City end there was a gap in the (so-called) circle of over half a mile. To and from Victoria terminus a fairly frequent service was then provided to and from Willesden Junction (low level) —in 1880 there were 15 such trains one way and 16 the other, these numbers being about high-water mark. But in lessened numbers these trains still ran until the middle of the war period.

Early in the 'seventies the District Company had been given running powers into Addison Road, but those powers they never exercised, as they did not wish to contribute to the up-keep of the latter station. When, in 1872 (month of August), the Great Western trains between Moorgate and Addison Road were extended to Mansion House—thus forming the so-called "Middle Circle" service—for a few years some of the trains were formed of District coaches, though all were hauled by Great Western engines. These trains, added to the Broad Street ones, gave a service of four trains hourly between the District system and Addison Road, but wholly by companies foreign to the "D.R."

In the middle of the 'seventies, the Euston authorities began to work their own trains from Willesden Junction over the territory of railways south of the Thames; these trains to a great extent replaced some of the services already spoken of as running in the 'sixties, but differed from them in being purely London and North Western trains in engines and coaches throughout, with no change of the former at Addison Road. In 1880 (for example), 9 trains started from Willesden for Waterloo, and 5 for Croydon *via* Crystal Palace and Norwood Junction: the former called everywhere, the latter were fast ones. The Waterloo service (to and from the L. & S.W. terminus) lasted well into the 'nineties, though it soon shrank to 8, and at last to 7 trains each way, but so long as it existed passengers by changing at Willesden could be in Waterloo Station within half-an-hour or less of the time their train was due at Euston, *i.e.*, quite as soon as the cabs of those days—there were no taxis—could have brought them. But beyond a doubt, thousands of such cab journeys were made from Euston to Waterloo, and even to Victoria and *vice-versa*; such being the conservative habit of the British traveller.

In 1887 there was also a service of London and North Western trains, Willesden to Herne Hill (only 4 each way); as all the London, Chatham and Dover expresses, etc., then called at Herne Hill, this gave an admirable connection between the two main lines. But the service lasted only to 1900 inclusive, though later on there was one train each way daily (worked by the South Eastern and Chatham Railway throughout to Willesden Junction), with through coaches between Deal and Dover and Manchester.

Perhaps the Victoria-Southall service hardly deserved to succeed as a through route, though some use was made of the stops on long-distance fast trains at Ealing (Broadway), to somewhat better the Victoria connections, though the stops were mostly put on owing to the growth of Ealing into a considerable borough-town. (In 1880, and long afterwards, there were only 5 trips each way; most likely the service was only maintained because the Great Western Company were—and are—part owners of the "South Eastern and Chatham" side of Victoria terminus: for some years, about 1899 to 1906, the number of trains rose to 10 each way†, but all

* These ran direct from the "Hampstead Junction" line by a new curve which joined the old West London line at Mitre Bridge Box, 32 chains from Willesden Junction Station. This curve was opened about 1869, and with it the High Level platforms used by the L. & N.W. trains. Those used formerly by the North London (Kew or Richmond) trains lay west of the North Western ones: the whole station (both levels) was owned by the London and North Western Company.

† Including a few which run to and from Uxbridge or Windsor. To the last there was one Uxbridge-Victoria train each way, and one, down only, to Reading; all these were stopping trains.

Digitized by Google

of the same small coaches, and generally dismal appearance.) But in October, 1910, there was a new and bold effort made: the new direct line (*via* Wycombe and Bicester), was then open to Birmingham and beyond; by this route one or two Northern expresses were run to and from Victoria (instead of the somewhat overcrowded terminus of Paddington). In 1911, two such trains started from Victoria at 12-35 and 8-15 p.m. for Birmingham and Wolverhampton; these trains—and the corresponding up ones—called at Kensington (Addison Road) only between Victoria and Banbury; they were (except the "Sunny South" train) almost the only true expresses running over the West London system, and were made up of the most modern Great Western 8-wheeled stock. In the latter year (1911), through coaches worked on these trains between Queenborough or Folkestone and the Great Western Northern line, giving a direct service without change from the Midlands to the Continental steamers, or *vice versa*; also through coaches ran between Ramsgate (Harbour), serving on the way Broadstairs and Margate, and Wolverhampton (Great Western); but in each case the through coaches seemed to have no passengers in them. Once again, the public would not dance, though thus piped to; by 1912 the whole thing had been given up, what ought to have been a great success turning out a failure.

Unlike their northern partner in the West London system, the Great Western never had parliamentary powers over the District Railway: their trains ran to and from Mansion House, but only by permission. Hence, when about 1900 the latter company wished to get rid of all foreign trains from their line (the Metropolitan "Inner Circle" ones of course excepted), the authorities at Paddington were helpless: from the beginning—to follow the strict view—of this century (*i.e.*, January, 1901) the "Middles" ceased to "circle," as they terminated at Earl's Court: this

Photo.] [*J. F. Gairns.*

UXBRIDGE ROAD STATION, LOOKING TOWARDS ADDISON ROAD.

Digitized by Google

went on for some years, but in the end the Great Western trains from Moorgate Street stopped short at Addison Road (just as they had done forty or more years earlier). Some years later the London and North Western agreed to waive their right of access to Mansion House, and—after some years of Broad Street to Earl's Court half-hourly trains—finally the "Outer Circle" service was replaced by a shuttle one between Willesden Junction (High Level) and Earl's Court, running about every half-hour (with both gaps and extra trips). This change began about 1909; some odd things were done for a time with the trains at Willesden (for example, the North London* service to and from Kew Bridge was for a while supplied by the Earl's Court sets of coaches), but these do not belong strictly to "West London" history . . . Then came the the Great War, in the course of which one service after another was "suspended"; in many cases never to be put on again. So that in January, 1920, things stand as follows:—

Great Western Railway (joint service with Metropolitan Company): Edgware Road to Addison Road and *vice versa* about every 20 minutes, calling at all stations. (Electric trains.)

London and North Western Railway; Willesden Junction and Earl's Court; about 31 trains each way, calling at

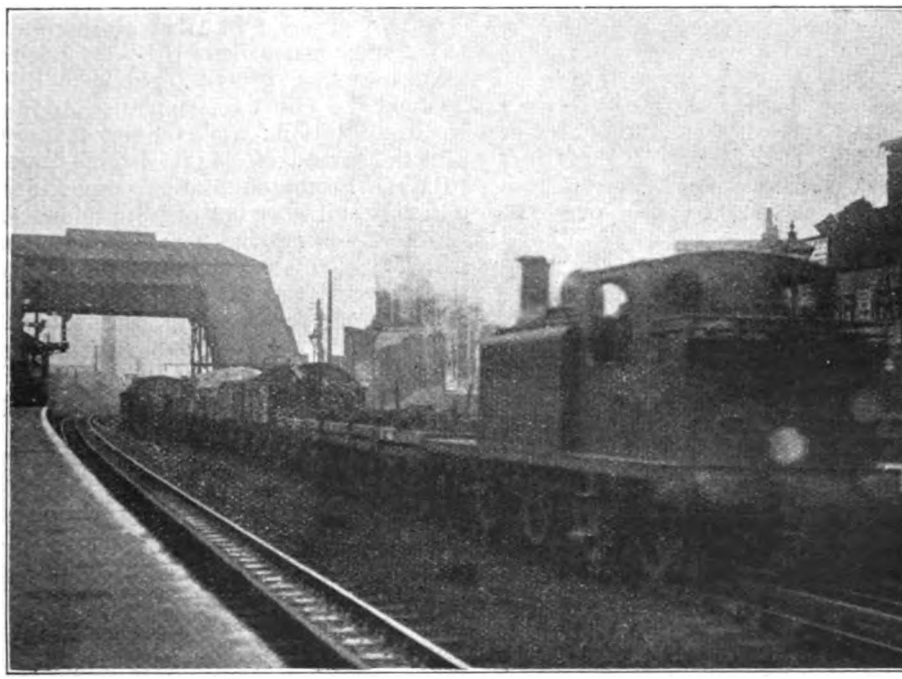


Photo.] [*J. F. Gairns.*

L.B. & S.C.R. GOODS TRAIN PASSING UXBRIDGE ROAD STATION.

* It may be objected that the London and North Western Railway were already joint owners of the line worked over by these trains. But though this is true technically—in fact the "North and South Western Junction" for many years has been owned jointly by the L. & N.W., Midland, and North London companies—from the outset the line has been controlled by the officers of the last-named company: also all passenger trains—except for certain periods when the Midland also ran their own trains over part of it—have throughout been North London ones. If, to-day, the trains are partly of London and North Western stock, that is only because the North London has practically become part of the London and North Western system, much as Egypt is now part of the British Empire.

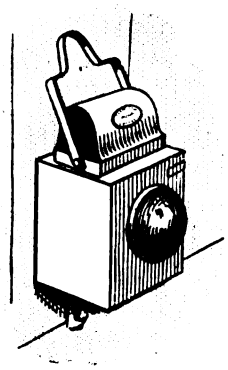
Digitized by Google

Addison Road and all other stations. (Electric trains.)

London and South Western and London Brighton and South Coast Railways (joint service): Clapham Junction and Addison Road, calling at all "W.L.E." stations; 19 trains each way, to and from No. 2 (London and South Western) or No. 9 (London, Brighton and South Coast) platforms at Clapham Junction, according to the company which works the train.

The Great Western service is a true joint one, the cars, of the same type as those of the Metropolitan Company, bearing the names of both companies, with the initials "H.C." of the joint line; the motormen and conductors are now always Metropolitan officials, while the current for the trains is supplied by the Great Western Company. The Metropolitan have no powers of their own over the West London line.

Thus in 1920 the only trains calling at Addison Road as an intermediate station are the Willesden—Earl's Court (electric) ones; all the others start or terminate, mostly using one or other of the roomy terminal bays. The metals of the Kensington, Hammersmith and Richmond line are rusting for want of use since some time in 1916, in fact, Grove Road Station at Hammersmith is derelict from that date onwards; at Acton Lane box, near Chiswick Park Station on the District Railway, the District Company's trains to and from Richmond, come on to the South Western line, on which the owning company now run no trains at all. So late as January, 1917, there were still six London and North Western trains into and out of Victoria (Brighton), and three each way to and from Croydon (East); but by the end of the year both services had ceased; the Great Western one into the other half of Victoria terminus had been discontinued some months earlier. These cuttings-down were partly war economies brought about by the growing shortage of engines and men, especially of men; but they also were due to the small use made of the West London line by the general public. Even "Olympia" failed to popularise Addison Road as a station; while the once favourite athletic ground of "Lillie Bridge," close to West Brompton Station, came to an untimely end when one of two professional sprinters was missing for a great running match which should have taken place there, and a wrathful mob wrecked the stands and pavilions of the grounds. Although the shuttle Clapham Junction service has had a life of some 56 years, and seems likely to go on as indefinitely, we can hardly look for a revival of the many other services (on the West London or its extension) which did not survive the Great War, or which had been given up before the eventful summer of 1914. "'Tis not in mortals to command success."



Digitized by Google

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

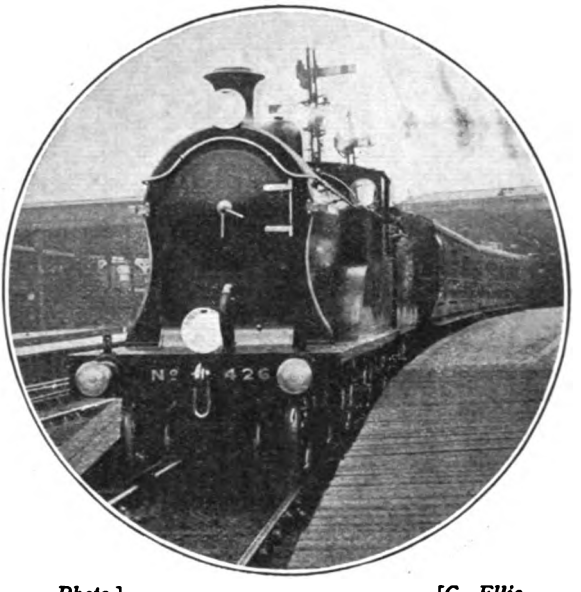


Photo.] [*G. Ellis.*

LONDON & SOUTH WESTERN RAILWAY.

West of England express leaving Waterloo.
4-4-0 engine, No. 426.

SO the new Great Northern main line locomotive turns out to be, not a 4-6-2 "Pacific," or even a 2-6-2 "Prairie" type engine, but merely an enlarged version of the "Moguls!" Not that this need be regarded as any disparagement of Mr. Gresley's new 2-6-0, No. 1000, as it is in several ways a remarkable machine. I think I am right in saying that this is the first 6 ft. parallel locomotive boiler in the British Isles—I say "parallel," as the diameter of the taper boiler fitted to the Great Western 4-6-2 *The Great Bear* increases to 6 ft. at the fire-box end—but it is, perhaps, a little surprising that the designer has not resorted to the 2-6-2 wheel arrangement in order to secure a proportionate development of the firebox, and a better distribution of the weight. For this is by a substantial margin the heaviest eight-wheeled engine in these islands, with its total weight of 72 tons, 60 tons of which rest on the coupled wheels. Another point of great interest is that Mr. Gresley's experience with the three-cylinder simple system of propulsion, first tried in the 2-8-0 engine No. 461, has decided him in favour of propelling the ten new "Moguls" in the same way. The cylinder dimensions constitute a notable advance on Great Northern standards, three cylinders 18½ in. diam. by 26 in. stroke being equivalent in nominal tractive effort to two a shade over 22½ in. diam. by 26 in. stroke. Driving wheels remain, as previously, of 5 ft. 8 in. diam., so that the new engines should be able to do good execution on fast and heavy goods trains, or such passenger trains of moderate speed and colossal weight as the 4 p.m. *ex*-King's Cross.

It is curious how the East Coast companies—and more especially the Great Northern and North Eastern Railways—"hang together" in their locomotive developments. With the exception of the Lancashire and Yorkshire and Great Central Railways, both of whom have in later construction superseded the 4-4-2 by the 4-6-0 or 4-4-0 for express passenger work, the East Coast lines are now the only ones relying mainly on "Atlantics" for the haulage of their principal long-distance passenger trains. And now the Great Northern seems on the way to appropriating that peculiarly North Eastern locomotive speciality — three-cylinder simple propulsion. On the latter line this system appears likely to become standard in all new constructions, the

Digitized by Google

recent three-cylinder development of the "T" class 0-8-0 mineral engines having now been followed by a three-cylinder class "S 3" of 4-6-0 mixed-traffic engines. This makes the sixth three-cylinder simple type on the North Eastern Railway, the chronological order of the six classes being:—"X," 4-8-0 shunting tank, 1909; "Y," 4-6-2 mineral tank, 1910; "Z," 4-4-2 express passenger, 1912; "D," 4-4-4 passenger tank, 1915; "T 3," 0-8-0 tender mineral, 1919; and "S 3," 4-6-0 tender mixed traffic, 1920. The first four classes alone total 100 engines. It will be remembered that the principal difference between Sir Vincent Raven's system and that designed by Mr. H. N. Gresley is that the former uses three sets of valve-gear for his three cylinders, while the latter, by an ingenious arrangement of the motion, is content with two.

But the most remarkable of all recent engines is unquestionably Sir Henry Fowler's "Decapod" on the Midland Railway—the first 10-coupled locomotive to see the light in these islands since the Great Eastern "Decapod" tank of 1900. If No. 2290 is intended exclusively for banking purposes on the Lickey incline, it may appear surprising that a tank design was not adopted in this case also, in preference to a tender type, in view of the uneconomical haulage of a heavy tender on a run only 2 miles in length, but it is understood that the carrying of the coal and water on a separate tender allowed of a greater development of the boiler without an undue increase in the weight of the engine. It may be, also, that the designer has a class of similar engines in prospect for ordinary main line work, in which case the adherence to one type, for purposes of standardisation, is certainly preferable. The introduction of such a type would reduce the excessive amount of piloting on the Midland main line, which, even allowing for the heavy loads taken by the piloted trains, must increase the costs of operation and maintenance disproportionately to the work actually performed. With four cylinders, 16¾ in. diam. by 28 in. stroke, the new engine ranks nominally as the most powerful in the British Isles; the equivalent diameter of two 28 in. stroke cylinders would be over 23 in. But so large a cylinder capacity, giving No. 2290 a

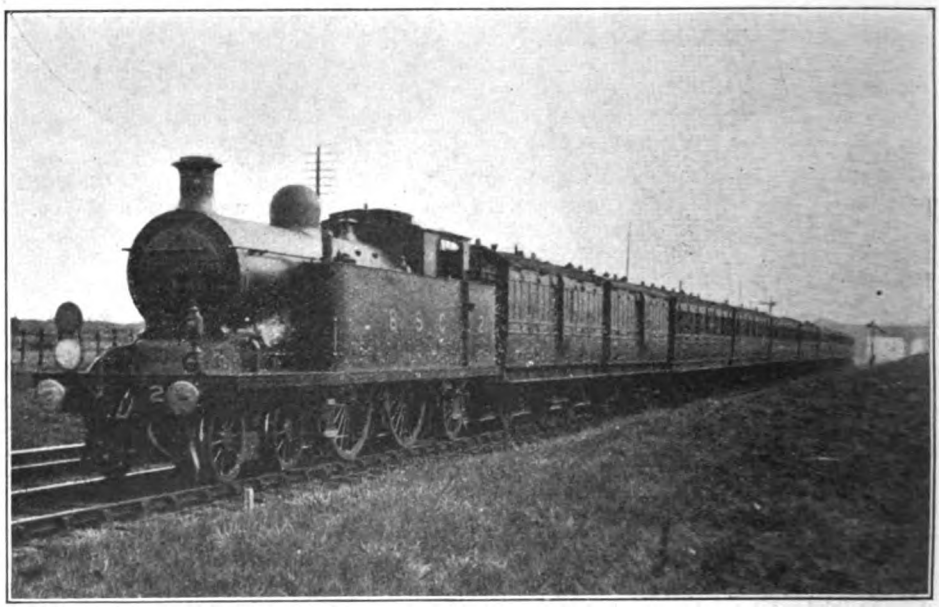


Photo.] LONDON, BRIGHTON & SOUTH COAST RAILWAY. [*F. W. Curtis.*

Horsham–London Bridge train. 4-4-2 express tank engine, No. 21.

Digitized by Google

tractive effort at 85 per cent. working pressure of no less than 43,300 lb., can only be provided, of course, in an engine of which continuous steaming for long periods is not required.

And now, to change the subject, some notes in a friend's letter in regard to loads require attention. In order to give the context of his remarks, I commence quoting at a point where he is explaining his praiseworthy attention to detail in the taking of his times. "I agree with you," he writes, "that it is best to take most station times, but I like, as far as possible, to keep mile-post timings all along, as an independent check on the station times. Generally I prefer to time at every complete mile-post, though I generally miss one or two. These, of course, are not necessarily 'for publication,' but more to keep an eye on the running throughout. Timing like this is busy work, but worth it, in my opinion, when possible." But now just listen to the same careful recorder, speaking on the subject of loads. "When it comes to estimating loads," he proceeds, "I am afraid I am less energetic. It's a longish job going all along the train looking for the weights of each of the coaches. As far as I can see, it can only be satisfactorily done at the starting or finishing point of the train. Even then, the spare time cannot always be found conveniently, and the composition may change *en route*. I think it is best to give the composition of the train, whether estimating the weight or not. I can well imagine, if your correspondents send you logs with the weight only given, that you sometimes wonder how they make it out." I do, in very truth, and not infrequently I am compelled to write and cross-examine them on the matter. If only all my friends who send their records to me for perusal would bear in mind the golden rule of giving in detail the composition, as well as the tare tonnage of their trains, it would save me many anxious moments of speculation as to whether the particulars may be accepted as authentic or not. And let it also be remembered that any doubt as to the accuracy of a log effectually precludes it from being published.

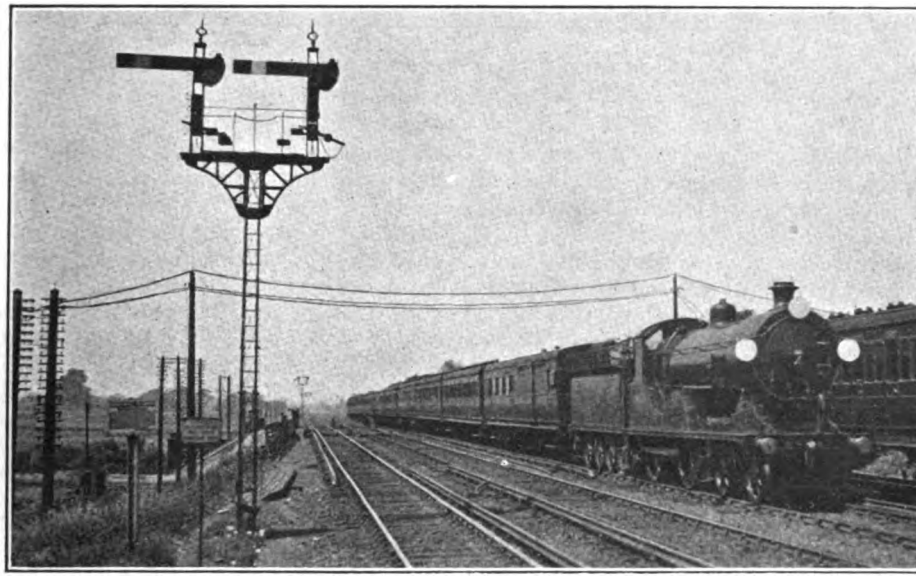
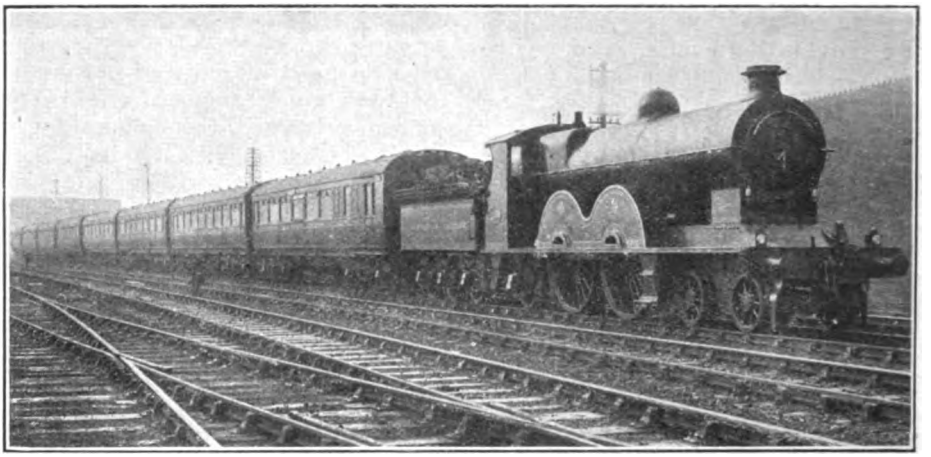


Photo.] LONDON & SOUTH WESTERN RAILWAY. [*J. F. Dearden.*

Up Bournemouth Breakfast Car express passing Raynes Park. 4-4-0 rebuilt superheater locomotive, No. 472.

After making the foregoing remarks, the writer's last Parthian shot is as follows:—"In any case, I doubt if the

Digitized by Google



LANCASHIRE & YORKSHIRE RAILWAY.
Manchester–Southport "fireproof" corridor train.

exact weight is a matter of much consequence." If exactness in weight is of little consequence, why should exactitude in times be of any importance? In a subsequent epistle, enclosing some more logs, my friend's conscience appears rather to prick him, as he writes in a somewhat less truculent style thus:—"With regard to the weights of coaches, I added up the weights of the four through coaches from Tenby . . . ; they amounted to within 2 cwt. of 115 tons. The remainder of the train, also four bogies, weighed about the same. I should imagine that an average of about 30 tons per coach would cover most of the loads given, when coaches were not very full; slight additions must be made for 'diners,' &c., also for very heavy loads of passengers and luggage. This is a very rough way of reckoning, but I am always inclined to imagine that too much stress may be laid on exact weights, and too little on the type of coaches used, which may considerably affect resistance. However, I have added an estimate of weights in the margin, just to show there is no ill-feeling!" As my correspondent's previous logs have vouchsafed no further information as to loads than to state that the train consisted of so many "bogies," which on the Great Western Railway (his particular favourite) may imply anything from an early 18-ton bogie brake to a 37-ton restaurant car, it is evident that the "type of coach" composing the train does not *really* bulk as of much more importance in his mind than its weight. In brief, my friend represents a class of enthusiast—he is not by any means the only one I have run up against—to whom by far the maximum interest of locomotive performance is concentrated in the times observed. No trouble is too great in securing an accurate record of these times, and yet, strangely enough, accuracy in other relevant particulars is deemed as of minor importance.

In connection with the question of coach resistance, I received some time ago a letter from another correspondent, commenting upon some remarks I made upon the subject of weights in the December issue of 1913. "You say," he writes, "that a train of ten 57 ft. corridor eight-wheelers and three 12-wheeled dining cars on the London and North Western Railway would be reckoned as '=21,' or on the same basis as fourteen 42 ft. bogies of the old stock, although the respective tare weights would be something like 430 tons and 310 tons. I agree that it seems absurd. But surely the *resistance* of the latter will be more than three-quarters of that of the former? It may be granted that each axle presses less heavily on the rails in the latter case than in the former. But, the number of axles being equal, the resistance of the train of old stock would surely be nearer seven-eighths than three-quarters that of the new. To put the matter in another

Digitized by Google

light, assume that the old vehicles weigh 22 tons each. To get 430 tons you would want over 19 of them. Do you not think that the engine with the 58 axles of newer stock would beat the locomotive with the older train of 76 axles? Do you not think that 'a train of ten 70 ft. corridor eight-wheelers, including restaurant car,' on the Great Western Railway, would beat the train of '43 horse-boxes' of equivalent weight? To reckon by tons seems the best way, of course, but it can be misleading." There is a great deal in my correspondent's contention, although, with the stock in good running condition, I should doubt if the resistance is increased in quite the proportion he claims when the ratio of the number of vehicles to their aggregate tonnage is increased. There are also other factors which affect train resistance. Dynamos driven from the axles for lighting purposes increase it. Coaches with rounded ends, such as those in use on the Great Northern and East Coast corridor expresses, reduce the resistance, as does also the provision of continuous vestibules between coaches.

But with allowance for all these variations, there is no doubt that to reckon by the tare tonnage of the stock affords by far the most accurate indication of the work required of the locomotives on the vast majority of the express trains on which the running is timed. The method is certainly a much more reliable one than that of reckoning by axles, and still more reliable than reckoning by coaches; it is, in fact, sufficiently indicative of the value of estimation by tonnage that this is the practice of so many companies in passenger train operation to-day. And, so far as the amateur recorder of running is concerned, it surely is not a very difficult matter, after one has obtained one's seat, to walk down the train and total up the tare weights of the vehicles. If there is no time to do it at the starting point, an intermediate stoppage at some important junction will generally provide the necessary opportunity. After long-continued travelling, of course, it becomes possible to estimate the weight of a train almost at sight, with the smallest possible margin of error, from close acquaintance with the various vehicles composing it. But this should only be attempted by the most experienced, and it is well *always* to check the weight when this can be done. Talking of weight, by the way, I find that some of my younger friends appear to be under the impression that 10 per cent. is always a fair addition to make to the tare tonnage in respect of passengers and luggage, whereas, when writing on this point, I was careful to explain that 10 per cent. is the *maximum*

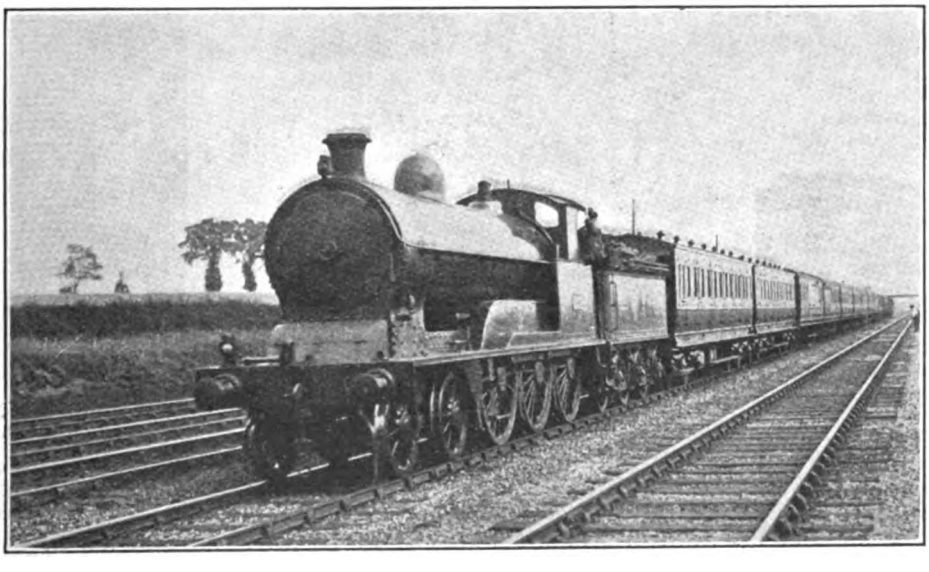


Photo.] LONDON & NORTH WESTERN RAILWAY. [*W. H. C. Kelland.*

4-6-0 locomotive ("Experiment" class) on empty stock train near Kenton.

Digitized by Google

complement of a corridor train when it is crowded even to standing. A more general figure at the present time would be 5 per cent., or very little over.

While speaking of accuracy, I cannot refrain from quoting from several records which I have received recently from various correspondents—mostly, I should judge, distinctly embryo enthusiasts—records that are destined, I fear, never to see the light of full publicity in these columns. One sends some runs between Fishguard and Cardiff, on each of which the train appears to pass *Neyland* (!), not to mention another station of unknown locality yclept variously "Llyndiran" and "Llydiran." Another correspondent, prefacing a Midland log from St. Pancras to Derby with the remark, "I can vouch for the accuracy of the timings, &c.," begins right away thus:—"From St. Pancras we passed Hendon, 6·9 miles, in 12 min. 33 sec.; Elstree, 12½ miles, 20 min. 6 sec., with a minimum of 51 m.p.h. up the 1 in 176 bank . . ." If the 5·6 miles from Hendon to Elstree occupied 7 min. 33 sec., and the *average* speed between these points was therefore 44·5 m.p.h., how on earth could the *minimum* speed be 51 m.p.h.? The remainder of the run appears fairly accurately recorded, although it would be

GREAT NORTHERN RAILWAY.

5.30 p.m. Express, King's Cross to Newcastle. Analysis of Fastest Post-War Actual Running Times, London–Grantham.

Stations.	Intermediate. Distances.	Intermediate. Times.	Intermediate. Average Speeds.	Engine 4-4-2 Superheater.	Load.	Aggregate. Distances.	Aggregate. Times.	Schedules. Pre-war.	Schedules. Present.	Max. and Min. Speeds.
	miles.	m. s.	m.p.h.	No.	tons.	miles.	min. s.	min.	min.	m.p.h.
King's Cross	—	—	—	—	—	0·0	0 00	0	0	—
Finsbury Park	2·5	6 15	24·0	1447	250	2·5	6 15	—	—	—
Wood Green	2·5	3 05	48·4	1447	250	5·0	9 20	—	—	59
New Barnet	4·2	5 10	48·8	1418	250	9·2	14 30	—	—	—
Potter's Bar	3·5	4 25	47·6	1418	250	12·7	18 55	—	—	47
Hatfield	5·0	5 05	59·0	1418	250	17·7	24 00	23	29	72½
Welwyn	4·3	4 05	63·3	1447	255	22·0	28 05	—	—	—
Knebworth	3·0	3 30	51·4	1418	250	25·0	31 35	—	—	50
Stevenage	3·6	3 35	60·3	1418	250	28·6	35 10	—	—	—
Hitchin	3·3	3 00	66·0	1457	365	31·9	38 10	38	45	—
Three Counties ..	3·8	2 55	78·2	1457	365	35·7	41 05	—	—	80½
Arlesey	1·3	1 00	78·0	1457	365	37·0	42 05	—	—	70½
Biggleswade	4·1	3 20	73·8	1447	250	41·1	45 25	—	—	76½
Sandy	3·0	2 30	72·0	1447	250	44·1	47 55	—	—	71½
Tempsford	3·4	2 55	70·0	1447	250	47·5	50 50	—	—	69
St. Neot's	4·2	3 50	65·7	1447	250	51·7	54 40	—	—	64½
Offord	4·3	3 45	68·8	1447	250	56·0	58 25	—	—	71½
Huntingdon	2·9	2 45	63·3	1444	455	58·9	61 10	64	73	—
Abbot's Ripton ..	4·6	5 10	53·4	1458	400	63·5	66 20	—	—	50½
Holme	5·9	5 10	68·5	1405	255	69·4	71 30	—	—	75
Yaxley	3·2	2 50	67·8	1417	265	72·6	74 20	—	—	—
Peterborough*	3·8	4 15	53·6	1405	255	76·4	78 35	84	91	*20
Werrington Junction ..	3·1	4 50	38·5	1418	250	79·5	83 25	—	—	61
Tallington	5·3	5 20	59·6	1414	250	84·8	88 45	—	—	65
Essendine	3·8	3 30	65·1	1414	250	88·6	92 15	—	—	64½
Little Bytham	3·6	3 35	60·3	1414	250	92·2	95 50	—	—	56½
Corby	4·9	5 30	53·5	1414	250	97·1	101 20	—	—	—
Stoke Summit	3·0	3 40	49·1	1418	250	100·1	105 00	—	—	48½
Grantham	5·4	5 45	56·3	1403	315	105·4	110 45	117	124	72½

* Service slack; No. 1418 reduced to this figure before making the time of 4 min. 50 sec. on to Werrington Junction.

Digitized by Google

much easier for me to follow were it given in tabular rather than in prose form. A third reader, whose exploits on the Glasgow and South Western Railway occupied our attention recently, has been trying his hand again on the Caledonian Railway, with somewhat startling results. From Greenloaning to Kinbuck, although the line is only slightly downhill, and the time of 3 min. 40 sec. for three miles denotes an average speed of 49·1 m.p.h., our young friend claims a maximum speed of 80·8 m.p.h.! "I am *positive*," he writes, "that we went over 37 joints in ¼ min."—that, by the way, would mean not 37, but 36 rails; I wonder how many of my readers who essay to estimate speed by the rail-joint method remember to commence their counting at "0," and not at "1"—"I feel certain that the 80·8 m.p.h. is right enough, as the train was swaying a good deal, and looked to be going very fast. I know the rails are 32 ft. between Perth and Forfar, and I think they are bound to be 48 ft. between Dunblane and Glen-eagles." The foundation on which this confident speculation is based is not divulged. "All my maximum and minimum speeds," the writer adds, "are calculated by the rail-joint method."

And I am constrained to add that this aspiring speed-monger requires a great deal of practice in timing by mile-posts before he should so much as have attempted to estimate maximum speeds off the rail-joints. I am beginning increasingly to regret, indeed, that ever I drew attention to the latter method, seeing that it is —as Baedeker would describe one of the particularly hazardous Alpine ascents—"for experts only." No mistake can be made in taking the times between mile-posts, other than that of misreading the watch, although to beginners I would never recommend timing over anything less than a full mile, when the second-hand of an ordinary watch is being employed; but in the hands of those who have no "sense" of speed, born of long experience, the making of a fundamental error at the very outset as to the

Photo.] GREAT NORTHERN RAILWAY. [*J. G. Irving.*

Up Anglo-Scottish express starting from signal stop near Potter's Bar.
Large 4-4-2 engine, No. 300.

Digitized by Google

length of the rails traversed leads in the rail-joint method to simply fantastical results. Had our young friend, when in doubt as to the length of his rails, taken the elementary precaution of checking the number of joints in a quarter-mile off a couple of mile-posts, he would have seen that the rails were not 48 ft. long, but other budding aspirants to proficiency in train-timing, to leave rail-joint speed estimation severely alone until he and they have acquired a vast deal more travelling experience than is at present evident. And, in all these cases, surely a little close examination of the logs, and a comparison with others over the same routes

GREAT NORTHERN RAILWAY.

5.30 p.m. Express, King's Cross to Newcastle. Analysis of Fastest Post-War Actual Running Times, Grantham–York.

Stations.	Intermediate.			Engine 4-4-2 superheater.	Load.	Aggregate.		Schedules.		Max. and Min. Speeds.
	Distances.	Times.	Average Speeds.			Distances.	Times.	Pre-War.	Present.	
	miles.	m. s.	m.p.h.	No.	tons.	miles.	min. s.	min.	min.	m.p.h.
Grantham	—	—	—	—	—	0·0	0 00	0	0	—
Barkston	4·2	6 35	38·3	251	230	4·2	6 35	—	—	—
Hougham	1·8	1 30	72·0	1452	255	6·0	8 05	—	—	75
Claypole	3·9	3 05	76·0	1455	335	9·9	11 10	—	—	77½
Newark	4·7	3 45	75·2	1455	335	14·6	14 55	16	17	76½
Carlton-on-Trent ..	6·3	5 30	68·7	273	250	20·9	20 25	—	—	67
Crow Park	1·0	0 55	65·6	273	250	21·9	21 20	—	—	65
Tuxford	4·5	4 50	55·9	273	250	26·4	26 10	—	—	—
Markham Box	1·8	2 00	54·0	251	230	28·2	28 10	—	—	52½
Retford	4·9	4 50	60·9	251	230	33·1	33 00	36	37	71½
Ranskill	5·3	5 10	61·5	273	250	38·4	38 10	—	—	—
Bawtry	3·8	3 15	70·2	1452	255	42·2	41 25	—	—	71½
Piper's Wood Box ..	1·7	1 45	58·3	1452	255	43·9	43 10	—	—	57½
Rossington	1·9	1 50	62·2	1452	255	45·8	45 00	—	—	70½
Doncaster	4·7	4 15	66·4	1452	255	50·5	49 15	54	56	—
Arksey	2·1	2 05	60·5	1436	365	52·6	51 20	—	—	—
Shaftholme Junction ..	2·1	2 10	58·2	1436	365	54·7	53 30	59	61	—
Moss	2·8	2 40	63·0	251	230	57·5	56 10	—	—	67
Balne	3·0	2 50	63·5	251	230	60·5	59 00	—	—	—
Heck	1·3	1 15	62·4	251	230	61·8	60 15	—	—	—
Templehirst	2·5	2 30	60·0	251	230	64·3	62 45	—	—	—
Selby*	4·6	5 00	55·2	251	230	68·9	67 45	76	79	25*
Riccall	4·1	5 40	43·4	298	320	73·0	73 25	—	—	—
Escrick	2·6	2 45	56·7	251	230	75·6	76 10	—	—	—
Naburn	2·9	2 45	63·3	251	230	78·5	78 55	—	—	64½
Chaloner Whin Junc. ..	2·2	2 05	63·4	251	230	80·7	81 00	—	—	—
York Station	2·0	—	—	—	—	82·7	†84 00	94	—	—
Clifton Junction ..	0·3	5 10	—	251	230	83·0	‡85 30	—	99	—

* Service slack; No. 298 reduced to this figure before making the time of 5 min. 40 sec. on to Riccall.

† Equivalent net time to stopping in York Station.

‡ Net total time: 35 sec. lost by No. 251 by adverse signals at Holbeck Bridge.

32 ft., which reduces his maximum speed from 80·8 to 53·9 m.p.h.—a figure in agreement with the average of 49·1 m.p.h. Similarly, his wild estimate of no less than 87·3 m.p.h. in descending from Greenhill to Larbert on the down journey resolves itself into the reasonable figure of 58·2 m.p.h.! I would counsel him, and all that have been published in previous issues, before they are subjected to my lynx-eyed scrutiny, would prevent the authors of them from making such abjectly foolish mistakes.

I had not intended referring again so soon to the work of the Great Northern Railway, but some of the running I have

Digitized by Google

timed recently on the 5.30 p.m. *ex*-King's Cross has been of so noteworthy a character that it is a pleasure to me to deal with some further runs timed since those described in the February issue. It is very disappointing, by the way, to find practically no alteration of this or the corresponding express in the new April time-tables, especially the up train, which preceded the up Leeds express (due in London at 1.55 p.m.) from Doncaster on a recent Friday, when I was a passenger, and strolled into King's Cross without the remotest suspicion of effort at 1.57 p.m., 13 minutes early! A week previously we ran in at 2 p.m. precisely. But the customary fate of this train is to approach Doncaster very shortly after 10.30 a.m., well before time, and thereafter to suffer endless checks from the Leeds train all the way to Peterborough. On a recent occasion I timed a driver of the literally "ca' canny" order, proceeding on the level near Shaftholme with a seven-coach train at the rate of 35 m.p.h., in order to escape this fate!

With so many excellent runs on the 5.30 p.m. down, it is difficult to know which to pick out for description, so that very brief descriptions of the leading features of the best runs must suffice. On the Monday after Christmas, driver Chatwin, on No. 1418 (superheater), had to deal with a very heavy and full 62-axle train, weighing 431 tons empty and 470 tons gross. Through the tunnels the rails were terribly greasy, and, in consequence of slipping, we took no less than 12¾ min. to get through Finsbury Park, 31¼ min. to Potter's Bar, and 37 min. 5 sec. to Hatfield. Touching 69 m.p.h. here, and not falling below 49½ at Woolmer Green, we ran the 14·2 miles from Hatfield to Hitchin in 14 min. 35. sec., and the 5·1 miles on to Arlesey in 4 min. exactly, with a maximum of 79 m.p.h., but then came a string of signal checks from the 4.15 and 5 p.m. down trains ahead of

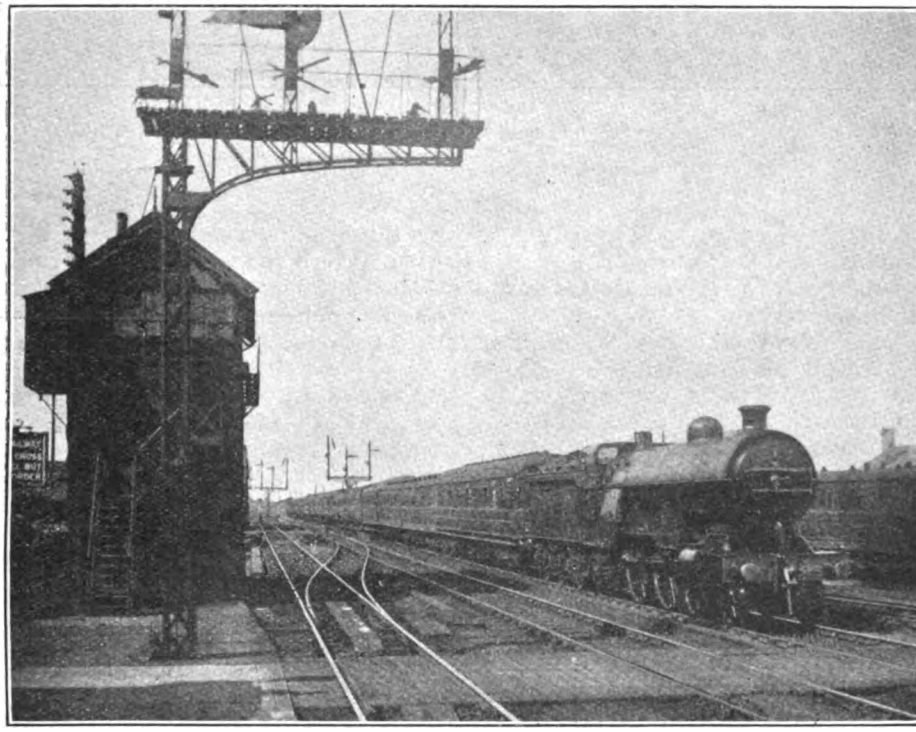


Photo.] GREAT NORTHERN RAILWAY. [*F. H. Stingemore.*

Up Newcastle and York express passing Hitchin yard box. 4-4-2 superheater engine, No. 1452.

Digitized by Google

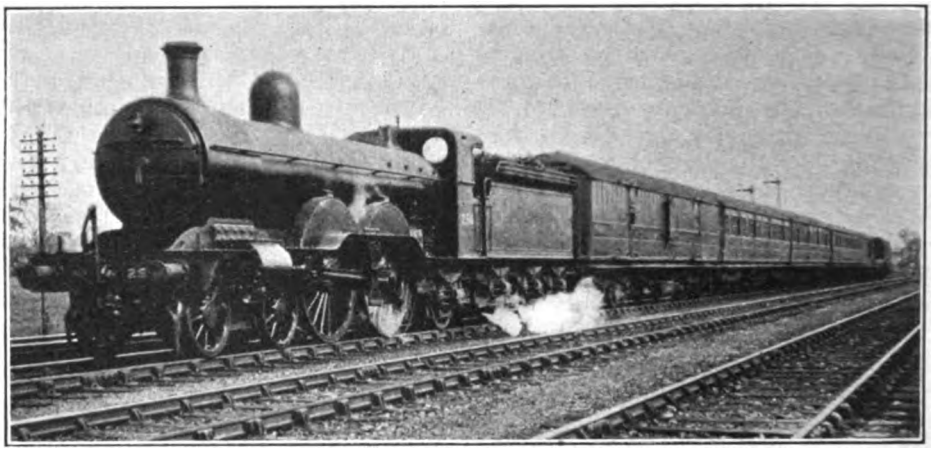


Photo.] **GREAT NORTHERN RAILWAY.** [*F. W. Curtis.*

Down express. Small 4-4-2 locomotive, No. 256.

us, both of which we passed at Peterborough. With so heavy a load the succeeding times of 15 min. 35 sec. on to Essendine, 16 min. 55 sec. thence to Stoke, and a total of 39 min. 10 sec. from Peterborough to Grantham, were quite good.

Superheated "Atlantic" No. 282 figures in three runs, having on the first two the now normal 34-axle load of 250 tons all told, while in the third an extra eight-wheeler brought the total up to 271 tons empty, or 290 tons full, the train on this occasion being better filled than usual. Finsbury Park, 2·5 miles, was passed in 6 min. 40, 25 and 45 sec.; Potter's Bar, 12·7 miles, in 20 min. 10, 10 and 15 sec.; and Hatfield, 17·7 miles, in 25 min. 45, 30 and 45 sec. Schedule to this point is 29 min. Very easy running ensued, the Hatfield to Hitchin length taking 16 min. 10 sec., 15 min. 10 sec., and 14¾ min., while the succeeding length of 27 miles to Huntingdon, also run under easy steam, and concluding with a bad p.w.r. check, occupied 26 min. 45, 40, and 25 sec., total 68 min. 40 sec., 67 min. 20 sec., and 66 min. 55 sec. for the 58·9 miles from London. Thus, 4¼, 5¾ and 6 min. respectively had been gained on schedule. The ascent of Stukeley bank was hampered by the Huntingdon slack, but Peterborough, 76·4 miles, was passed in 89 min., 87 min. 5 sec., and 87½ min. (schedule 91 min.), 1 min. additional being lost on the third run by a signal delay at Fletton. After Peterborough the second run was spoiled by fog; on the first we covered the 12·2 miles on to Essendine in 15 min; the 11·5 miles thence to Stoke in 13 min. 55 sec., and Grantham, 105·4 miles, was reached in 124 min. 10 sec., or practically on time. On the third occasion we maintained 61½ m.p.h. beyond Tallington, passed Essendine in 14 min. 50 sec. from Peterborough, Stoke in another 13 min. 25 sec., at 45 m.p.h., and, despite a signal check outside Grantham, reached there in 122 min. 30 sec. from London. Net time on the first run was 121 min., and on the third, with a nine-coach train, 118½ min.

Passing over several other good trips, I come to two of recent date, both with 250-ton trains. Superheater 4-4-2, No. 1447, driven by Chatwin, started magnificently with a time of 6¼ min. to Finsbury Park and 9 min. 20 sec. to Wood Green (where we were doing 59 m.p.h.), but suffered the penalty for this early effort by being badly checked at New Barnet. Then, after passing Hatfield in 27 min., we were stopped at Welwyn to work single line on the up road from there to Woolmer Green, on account of a wagon being off the road at the latter place. Nothing daunted, our driver set out in earnest to make up time, running from Hitchin to Sandy, 12·2 miles, in 9 min. 50 sec., with a maximum of 80½ m.p.h., and from there to Offord, 11·9

Digitized by Google

miles, in 10½ min., with a minimum of 64½ m.p.h. at St. Neot's. Unchecked, we should have run from Hitchin to Huntingdon in under 23 min., but there now began the delays caused by the blizzard of the previous night, and thereby we lost something like two hours! On the second of these runs, No. 1418, driven by Southwell, was the engine. We passed Finsbury Park in 6 min. 20 sec., Wood Green in 9½ min., Potter's Bar in 19 min. 5 sec., at 49 m.p.h., and Hatfield in 24 min. 10 sec., at 69 m.p.h. Easing after this, and also suffering two signal checks, costing 1¾ min., before Hitchin, we passed the latter point in 39½ min., and Huntingdon, where we met with the usual p.w.r. check, in 65 min. 40 sec., 7¼ min. early, despite all delays. After a top speed of 74 m.p.h. on Ripton Bank, we got very badly checked at Yaxley from the preceding 5 p.m. down, but even so we managed to get through Peterborough in 87 min. 50 sec., still over 3 min. early. Accelerating to 61 m.p.h. at Werrington, we were through Essendine in another 14½ min., and by not falling below 48½ m.p.h. at Stoke Summit, ran the Essendine-Stoke length in 13 min. 35 sec.; a final signal check at Saltersford did not prevent us from reaching Grantham in 122 min. 25 sec. from London, 1½ min. early! As nearly as I can estimate, the net time of this notable run was 115 min., and 81½ min. to Peterborough. This could easily have been cut still further between Hatfield and Huntingdon, had we not been so much before time.

Yet another first-class trip obtained at a later date behind 4-4-2, No. 1414, superheater, finely driven by Doolan, I must perforce include as it carries off the honours in the table for the ascent to Stoke Summit. The load was the usual eight-coach one of 250 tons. Starting excellently, we were through Finsbury Park in 6¾ min., Potter's Bar in 20 min., Hatfield in 25¼ min., and Hitchin in 40¼ min., 4¾ min. early. Maximum speeds were 54 m.p.h. at Wood Green, and 69 at Hatfield, while the minima were 41½ at Potter's Bar and 45 at Woolmer Green. Getting through Sandy in 51½ min., without higher speed than 72½ m.p.h. at Three Counties, we were very surprised to pass the 5 p.m. down between there and Tempsford, but this was only a preliminary to a dead stop at Barford Box, what time the 4.15 p.m. — which should reach *Grantham* 8 min. before us—was being got out of our way at St. Neot's. So it took us 73 min. 5 sec. to pass Huntingdon—the exact schedule time—and then for the first time since the acceleration of the train we contrived to maintain the 51 min. booking from there to Grantham. Falling to 46½ m.p.h. on

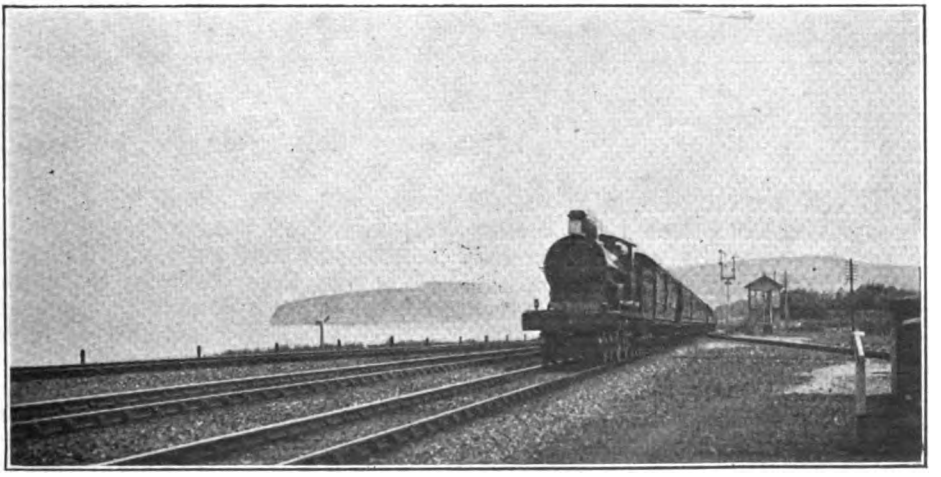


Photo.] LONDON & NORTH WESTERN RAILWAY. [*F. E. Jones.*

Irish Mail express passing Colwyn Bay. 4-4-0 locomotive, No. 648, "Archimedes."

Digitized by Google

Stukeley bank, we touched 74 on the descent to Holme, and passed Peterborough in 91 min. 20 sec. from London. Accelerating splendidly, we reached 60 m.p.h. at Werrington Junction, and 65 beyond Tallington, while on the subsequent ascent we actually had not fallen below 56½ on passing Little Bytham; at Stoke Summit the minimum was 47½ m.p.h., and we finally touched 72½ before stopping at Grantham. So the time from Peterborough to Werrington was 4 min. 50 sec. and from there to Tallington, 5 min. 20 sec.—equal to those of No. 1418 in the table—while 3 min. 30 sec. from there to Essendine 3 min. 35 sec. on to Bytham, and 5 min. 30 sec. thence to Corby, were in the aggregate a full minute better than my previous recorded times over these lengths. From Corby to Stoke we tied with No. 1418, although the latter had the higher minimum rate on the ascent of 48½ m.p.h. Had we equalled the fastest Stoke-Grantham time on this occasion, we should have run from Peterborough to Grantham in 32 min. 10 sec.; actually the time was 32 min. 35 sec., this being the first occasion on which I have recorded an improvement on the difficult 33 min. allowance over this section. The total time from London was therefore 5 sec. under the 124 min. allowed; deducting the Barford delay, we have a net time of about 116 or 116½ min.

North of Grantham there has been some equally fine running. Superheater 4-4-2 No. 298, driven by J. Parker, and hauling a nine-coach train of 290 tons, was fortunate enough to have a late start, a clear road, and a very enterprising driver. Attaining 75 m.p.h. before Newark, we compassed this initial 14·6 miles in 15¾ min., and passed Crow Park, 21·9 miles, in 22 min. 5 sec., still travelling at 66 m.p.h. Crow Park up to Markham, 6·3 miles, took 6 min. 50 sec., with a minimum rate of 52½ m.p.h., and Retford, 33·1 miles, was passed in 33¾ min. The running thence to Doncaster was a trifle easier in character, as the 17·4 miles took 17 min. 50 sec., with a minimum of 47½ m.p.h. at Piper's Wood; but Doncaster, 50·5 miles, was passed in 51 min. 35 sec.; Shaftholme Junction, 54·7 miles, in 5 sec. under 56 min., and Selby, 68·9

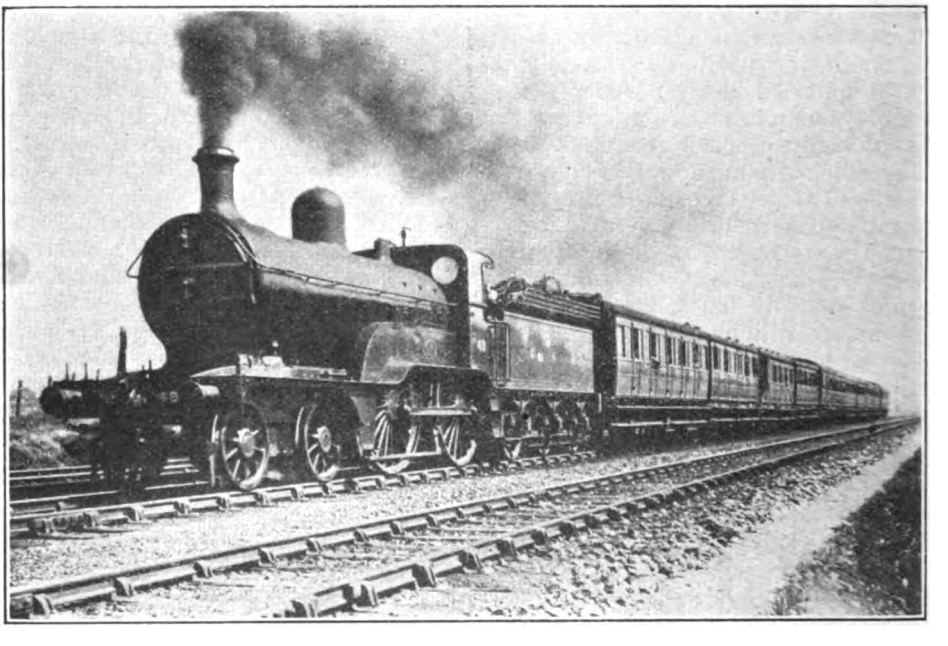


Photo.] **GREAT NORTHERN RAILWAY.** [*F. W. Curtis.*

Down Grantham train. 4-4-0 superheater engine, No. 49.

Digitized by Google

miles, in 71 min. exactly. To this point, therefore, we had gained a clear 8 min. on schedule. Slacking here over the swing-bridge as usual, we passed Chaloner Whin Junction, 80·7 miles, in 86 min. 35 sec.—this is equivalent to stopping in York Station in less than 90 min. from Grantham—but were delayed by signals at Holbeck Bridge, eventually reaching Clifton Junction, 83 miles, in 92½ min., or 91 min. net, 99 min. being allowed. This was a fine piece of work.

The pioneer large-boilered "Atlantic," No. 251, now superheated, had a lighter seven-coach load of only 230 tons, owing to a coach with a broken spring having been taken out of the train at Grantham. Attaining 72½ m.p.h. at Claypole, we passed Newark in 15 min. 55 sec., but were then stopped dead by adverse signals at Carlton. So it took 39 min. 35 sec. to pass Retford; but we ran on to Doncaster in 17 min. 20 sec., with a minimum of 52 m.p.h. at Piper's Wood, and then accomplished some very fast work on the succeeding level stretch to Selby, attaining 67 m.p.h., and covering the 18·4 miles from Doncaster in 18 min. 40 sec., instead of the 23 min. allowed. Thus we had gained 3½ min. to Selby, despite the stop at Carlton. To Chaloner Whin our time was 89½ min., and to Clifton Junction 94¾ min., with the usual concluding delays, less severe than usual. Net time from Grantham was not more than 88¼ or 88½ min., equivalent to a stop at York in about 87 min.; from Retford to Chaloner Whin this run actually bettered the one just described by 5 sec. over 3 min., but the load was 60 tons less.

No. 1452, the first superheated 4-4-2, got through Claypole, 10 miles fom Grantham, in 11 min. 20 sec. and was sustaining 76½ m.p.h., when we were brought virtually to a stand by signals outside Newark. A very bad p.w.r. check at Carlton followed, despite which we breasted Tuxford Bank so well as to pass Markham Summit at 50 m.p.h All to no purpose, however, as there was yet another check to walking pace before Retford. Then came some extraordinary running, as at Sutton we had accelerated to 60 m.p.h., and at Scrooby to 71½, while Piper's Wood ascent did not succeed in depressing the speed below 57½ m.p.h. So Retford to Doncaster only occupied 17 min. 10 sec., or 16¼ min. net., allowing for the slow rate of passing the former place. After Doncaster we went more easily, taking 21 min. 30 sec. thence to Selby, where we slacked to 30 m.p.h., while adverse signals dogged us from Naburn to the end of the run. It would be almost impossible to estimate the net time of this journey with any accuracy. Lastly, there was another remarkable run behind No. 273, superheater, driven by Barkliffe, with the normal 250-ton load. Attaining 75 m.p.h. beyond Hougham, we passed Newark in 15 min. 35 sec., Crow Park in 22 min.—practically "even time"—and Tuxford, 26·4 miles, in 26 min. 50 sec., but were then brought to a dead stand by signals at Lincoln Road box, a delay which I estimate must have cost us 5½ min. at the very least. Thus it took us 39¼ min. to get through Retford. Then ensued some more fine running, with maxima of 68 m.p.h. at Scrooby and 69 at Rossington, while the minimum at Piper's Wood was 52½ m.p.h. So we ran from Retford to Doncaster in 17 min. 10 sec., and continued thence to Selby in 19¾ min., total 76 min. 5 sec. from Grantham; the net time of 70½ min. for the 68·9 miles from Grantham to this point represented all but "even time" throughout, and a gain of 8½ min. on schedule. Once again signal checks ruined the conclusion of the run.

As a matter of academic interest, I have collated the best point-to-point times from all my post-war runs on the 5.30 p.m. from King's Cross to York in the two accompanying tables, one dealing with the running between London and Grantham, and the other with the continuation from Grantham to York. In the former it should be noted, first, that the fact of our constantly passing Hatfield so well ahead of time caused the running on even the best trips to be under very easy steam from there to Hitchin; work comparable to that occupying the rest of the table would have reduced this 14¼ min. by at least 30 sec. Again, owing to the chronic relaying caution at Huntingdon, I have had to take times between Offord and Abbot's Ripton from two pre-acceleration runs with much heavier loads. These, again, are easily capable of joint reduction by at least ¾-min., and the total from London to

Digitized by Google

Grantham would thereby be reduced to 108½ min., 8½ min. under the pre-war and 15½ min. under the present schedule. The second table is much more remarkable, and represents absolutely first-class running throughout. To Selby the total is well under "even time," and, considering that No. 298 reduced strictly to the regulation 30 m.p.h. over the swing-bridge, the figure of 84 min. to York Station is really remarkable. Thus, this analysis of running, drawn in its entirety from post-war runs, gives an aggregate net actual running time of 192½ min. from London to York, against a "best" pre-war schedule of 211 min., and a present one of 223 min. to Clifton Junction, 1½ minutes further on. Evidently, therefore, the Great Northern Railway has not yet "shot its bolt" in the matter of post-war acceleration!

On the North Eastern Railway, Driver Culley, on three-cylinder "Atlantic" No. 2197, put up some fine running beyond Clifton Junction with a ten-coach train of 315 tons. We started easily, taking 15 min. 40 sec. to Alne, 10·9 miles, and 20 min. 50 sec. to Pilmoor, 15·8 miles, but then appeared to wake up, as we went through Thirsk at 67 m.p.h. and touched 70½ beyond Danby Wiske, only falling intermediately to 65 at Northallerton and 64½ at Eryholme. So we passed Thirsk, 21·9 miles, in 26 min. 40 sec.; Northallerton, 29·7 miles, in 33 min. 50 sec., and Eryholme, 38·6 miles, in 41 min. 50 sec., reaching Darlington, after the usual slow stop, 43·8 miles, in 48¼ min., 2¾ min. under schedule. Nos. 721 and 732, of the same type, running together, made light work of the seven-coach 230-ton train, passing Alne in 13 min. 10 sec., Pilmoor in 17 min. 55 sec., Thirsk in 23 min. 50 sec., Northallerton in 31¼ min., and Eryholme in 39 min. 25 sec.; Darlington was reached in exactly 46 min. Speed touched 66 m.p.h.

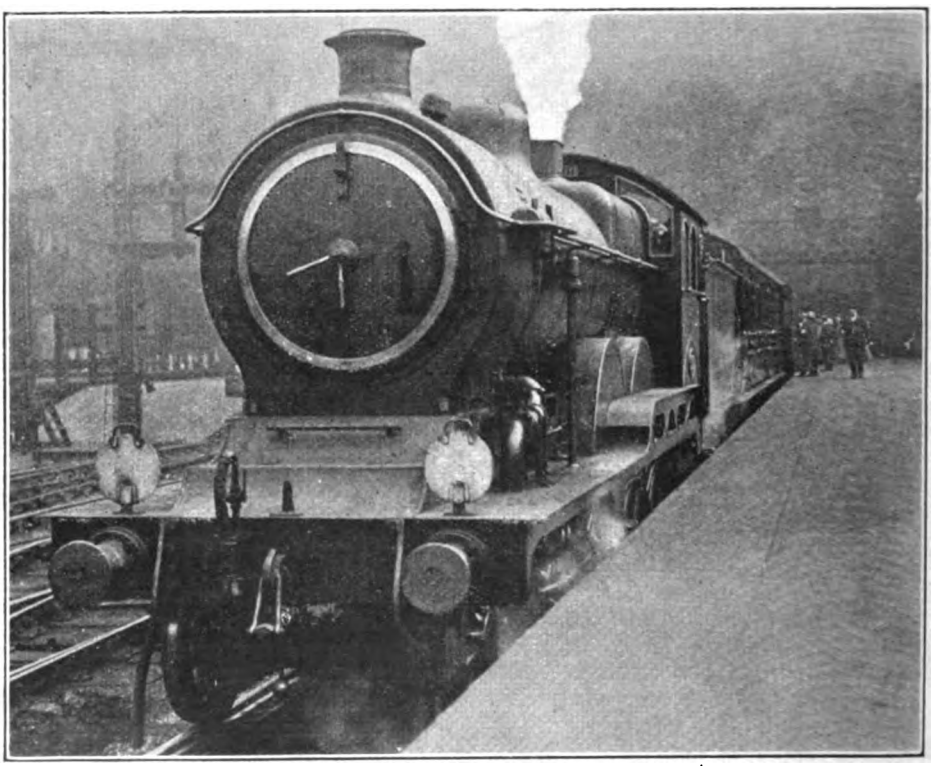


Photo.] GREAT EASTERN RAILWAY. [*E. L. Diamond.*

Down Cromer express at Liverpool Street. 4-6-0 locomotive, No. 1512.

Digitized by Google

at Thirsk and 70½ at Danby, and fell to 62½ at Northallerton and 64½ at Eryholme. By far the best run, however, was made by No. 718, with 255 tons. Alne was passed in 13¾ min., Pilmoor in 18 min. 25 sec., Thirsk in 24 min. 20 sec., Northallerton in 31¾ min., Eryholme in 40 min. 20 sec., and Croft Spa, 41·2 miles, in 42 min. 40 sec.; Darlington was reached in exactly 47 min., and that despite a very slow stop indeed. With the kind of finish current in pre-war days, we should have made the journey easily in 46 min. We had reached 59 m.p.h. on passing Beningborough, and accelerated further to 64½ at Tollerton and 65 at Raskelf; the minimum rate at Sessay was 64½ m.p.h., and the maximum at Thirsk again 66; Northallerton was passed at 61½ m.p.h. and Eryholme at 62½, with an intervening maximum of 66 at Danby and a subsequent one of 70½ at Croft. The 36 miles from Beningborough to Croft, slightly against the engine throughout, were run in exactly 34½ min. Such running as that described in the present article is indeed refreshing in these days, in comparison with the dead level of mediocrity which obtains elsewhere in the country, with but few bright exceptions.

THE OLDEST LOCOMOTIVE UNDER STEAM ON THE NEW SOUTH WALES GOVERNMENT RAILWAYS.

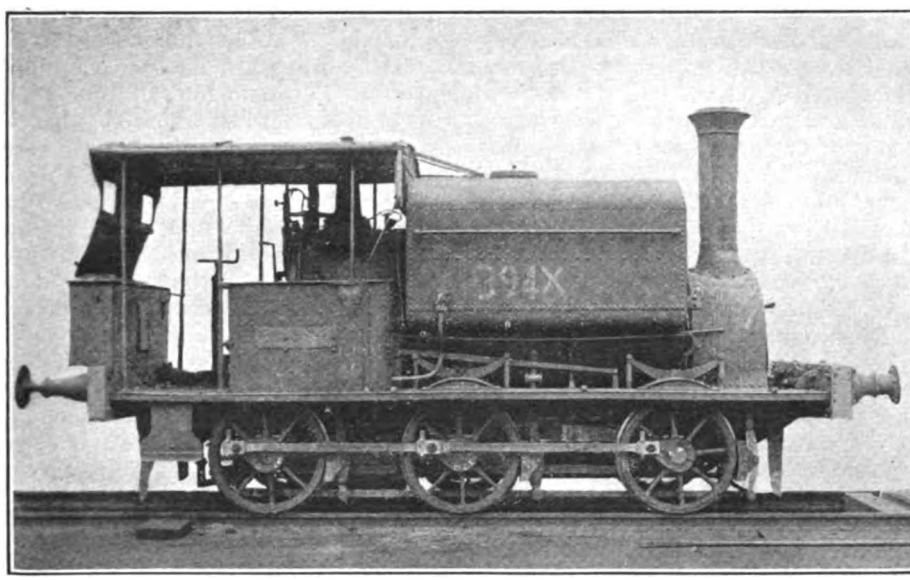


Photo.] [*C. F. Dewey.*

THE accompanying illustration, for which we are indebted to Mr. C. F. Dewey, depicts No. 394x of the New South Wales Government Railways. It is of the 0-6-0 saddle tank type, having inside cylinder, 11 in. by 17 in. and driving wheels 3 ft. in diam. It was built by Messrs. Manning, Wardle & Company, Ltd., of Leeds, in 1861, and is now the oldest locomotive in New South Wales.

It was purchased by the Government from Messrs. Peto, Brassey and Company in Sydney about 1864, and was originally No. 9 of the northern division. It has figured a great deal in construction work in and around Newcastle and East Maitland (N.S.W.), and this picture was secured when it was recently turned into Eveleigh (Sydney) shops for repairs.

Digitized by Google

Cadder Gravitation Marshalling Yard, North British Railway.

SITUATED about 5 miles from Glasgow, near Falkirk, on the Edinburgh and Glasgow main line of the North British Railway, Cadder gravitation marshalling yard constitutes a principal centre for the heavy goods traffic in this area conducted by the North British Railway. This has always been a busy place, but immediately prior to the war considerable improvements had been carried out, while developments in working methods also justify description in these pages.

The yard is divided into two sections, one on the up and the other on the down side of the main line. Length from end to end is about a mile, and the acreage covered by the sidings, groups and main line is 35 acres. There are 45 tracks, with standing accommodation for 2,600 wagons, and the average number of trains marshalled in 24 hours is 250, the approximate turnover of wagons of all kinds during that period being 6,000.

The up yard is entered from the west or Glasgow end, and the down yard from the east or Edinburgh end. Trains arriving at Cadder from Glasgow and the west are first placed in the reception sidings, from which they are hauled by shunting engines up the incline of 1 in 100 at the extreme west end of the yard on that side and gravitated into one or other of the two groups of sidings, comprising 18 roads in all in the up yard. This section of the yard has one running loop next to the main line and three reception loops, the sidings numbering 6 in one group and 12 in the other, each classified for particular divisions of traffic.

A large amount of the traffic dealt with in the up yard comes from the Glasgow goods stations of the North British Railway and the docks. Trains are worked through by trip engines from Glasgow to Cadder, and in many cases taken forward, after being marshalled, by other engines supplied from the Eastfield running shed at Cowlairs. Frequently engines bringing trains from the High Street and Sighthill goods depôt leave these trains to be marshalled at Cadder and work forward others which have already been made up there.

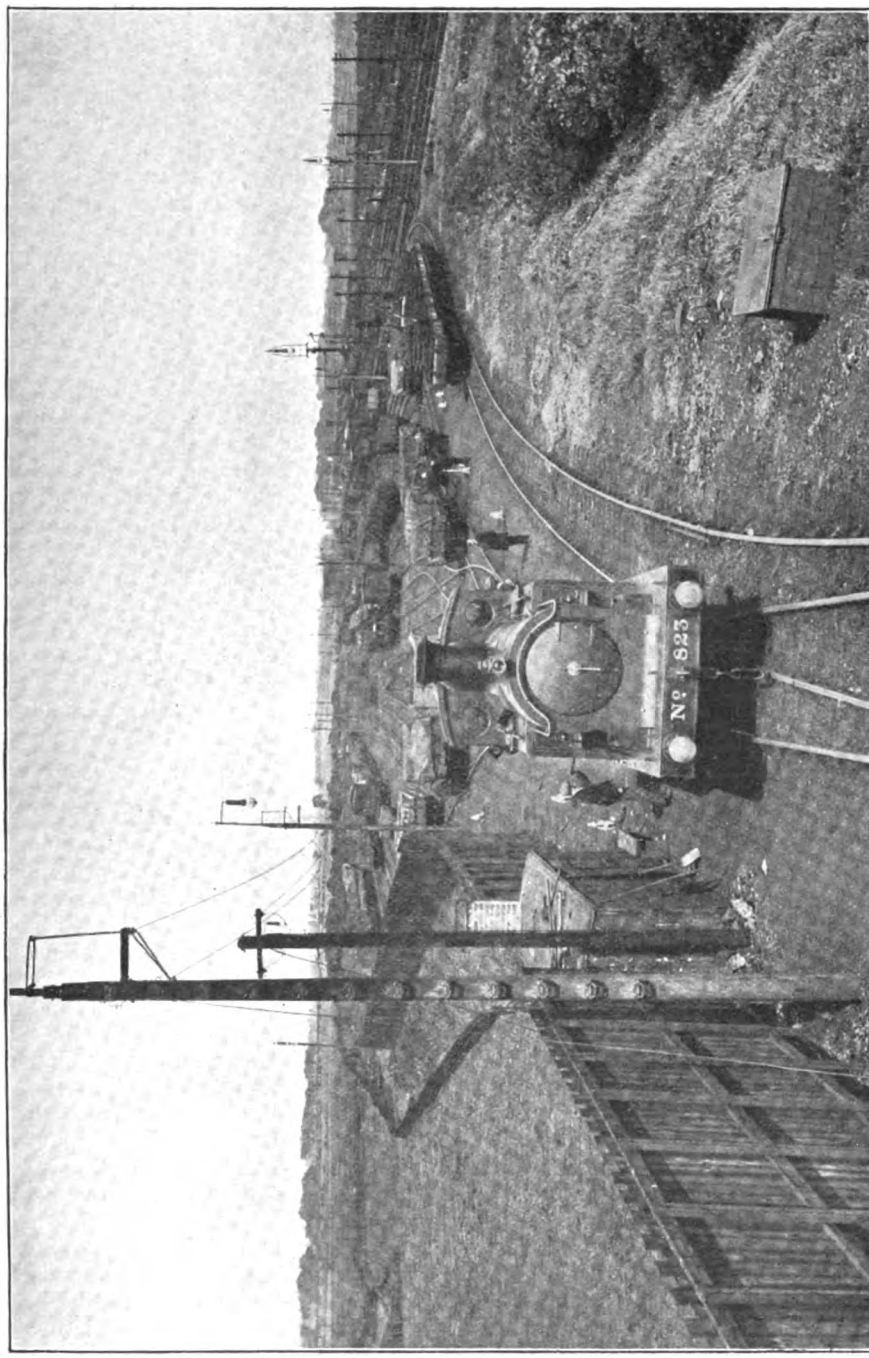
In marshalling the trains all traffic for one destination is placed on one particular track or section of the siding, being afterwards re-marshalled before going forward as a new train. As an example, all wagons for Dundee, Arbroath, Montrose, Aberdeen, &c., are placed next to one another in the siding and shunted out on the flat by engines at the east and west ends. Traffic dealt with on the up-side of the yard is mainly for destinations in the north, south and east, and consists mostly of goods and coal, with a fair proportion of other minerals.

The down yard has one running loop next to the main line and one reception loop for accepting trains running in the direction of Glasgow, either terminating at Cadder or calling at the yard to pick up or detach traffic. There are two groups of sidings, numbered 1 to 12, six in each group. After a train has come to rest in the reception loop the engine is detached and the train hauled up the grade and the process of marshalling the traffic in the respective sidings commenced. The incline on this side of the yard is not so pronounced as on the up side, but nevertheless a train of 55 trucks can be separated in a few minutes.

Traffic is thus segregated and placed in the respective roads for the different points and large distributing stations in the Glasgow area. Trains working from the large goods stations in Glasgow take direct loads, which are deposited in the up yard when the engines and vans cross over and pick up direct loads for the particular point to which the engine and van are booked to return. One shunting engine is employed continuously in this yard, while an additional engine is provided from 10 p.m. to 6 a.m. during the time the pressure of traffic is greatest.

While the traffic is generally allocated to the sidings as scheduled, double use is made of the sidings at certain hours of the

Digitized by Google



CADDER UP YARD, FROM WEST OR GLASGOW END.

Digitized by Google

night. When a train-load for one particular district is despatched the sidings are filled with other traffic as required to meet the exigencies of the particular time.

Traffic is extremely heavy in Cadder Yard during the night, the pressure commencing at about 8 p.m. and continuing till about 4 a.m., during which period there is a continuous flow of trains from and to the Glasgow area, either terminating at the yard with full loads requiring to be marshalled, or long distance trains passing through and putting down or picking up certain traffic to complete their loads in accordance with the destination of the trains.

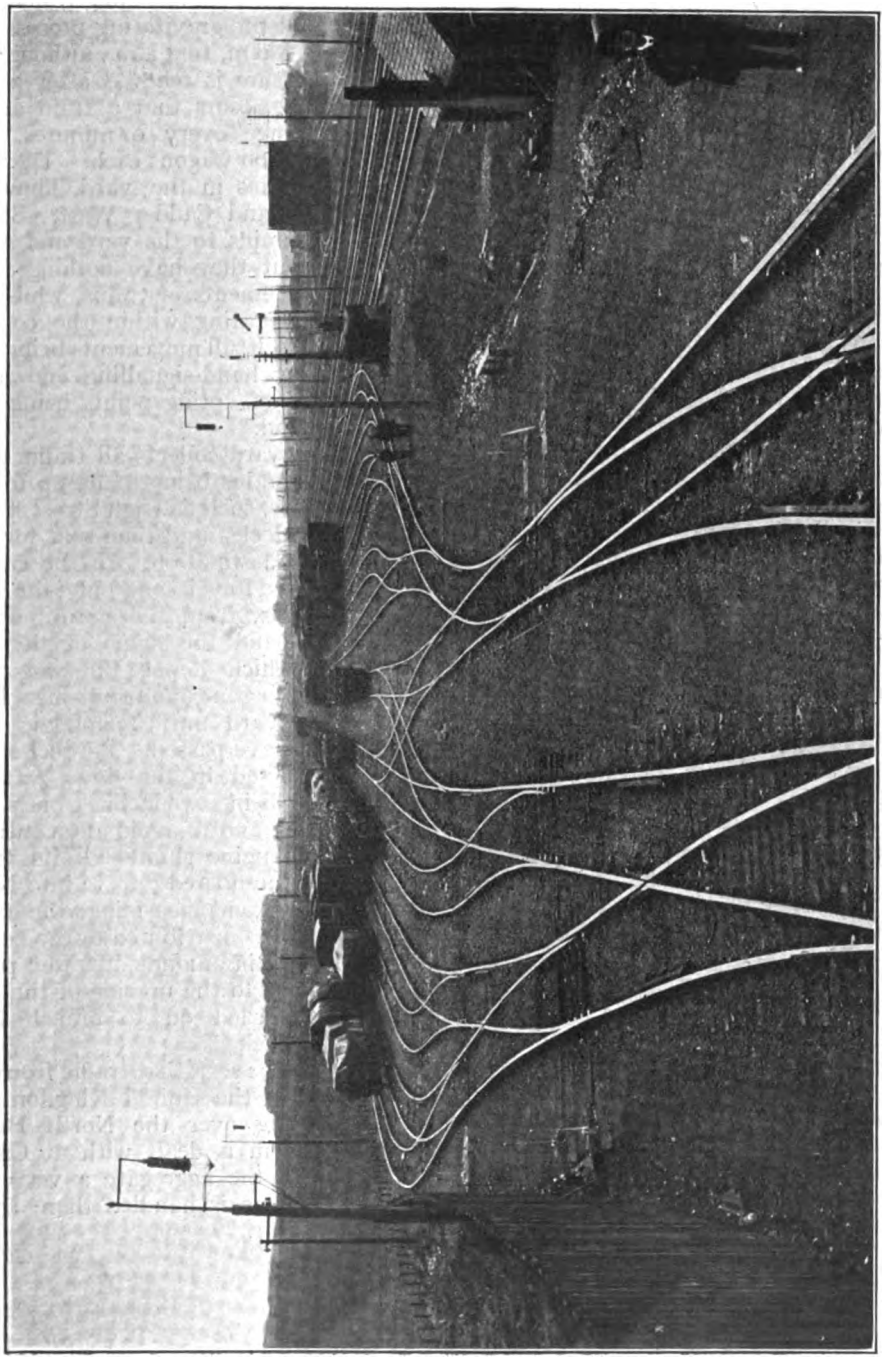
The mode of procedure adopted in the case of a train terminating at the yard may briefly be described as follows:—After the train has come to a standstill in the reception loop the regular train engine is detached and the pilot engine is coupled to the rear of the train, hauling it up the incline to the head shunt, which can turn 36 wagons at a time. In shunting the train, the labels attached to the wagons showing their destination act as a guide for the shunting operations. When all is ready the first shunter commences the process of uncoupling the wagons, calling out as he does so to the other shunters, whose work it is to direct them to the respective sidings, the number of the road on to which the wagon has to be diverted being communicated from one to the other. The shunters, five in number at this point, turn the points for the respective sidings and also apply the brakes, using brake-sticks when necessary to reduce the speed of the wagons running down the incline, thus avoiding damage to goods through rough shunting. The average time occupied in shunting a train of 55 wagons when in such a condition as to require the segregation of almost every wagon is about 15 minutes, although on numerous occasions it has been performed in 9 or 10 minutes.

At the west or gravitation end of the up yard the roads forming the sidings are numbered 1 to 18 from the south or main line side, so that No. 18 road is the last on the north side. In making up a train for the north, vehicles are set so that those for Aberdeen will come at the rear end of the train, then those destined for Great North of Scotland railway stations, followed by others for Montrose, Arbroath, Dundee, Thornton, &c.: all points short of Aberdeen being regarded as "local or intermediate." In addition, through trains are made up for Aberdeen only, several for Dundee direct and others for Perth, and also Carlisle and south thereof. Traffic for the East Coast and the North Eastern, Great Northern, Great Central and Great Eastern Railways travels via Berwick, and after being marshalled at Cadder is taken through to Meadows Yard, a few miles east of Edinburgh, where the trains are re-made in several sections, including those for North Eastern stations, Great Northern and South, and Great Central and Great Eastern railway stations, North British locomotives being replaced by those of the North Eastern Railway at Tweedmouth.

A large number of through trains call at Cadder Yard, both in the up and down directions to pick up or put down traffic, although not necessarily rearranging their complete loadings. The method of procedure in such a case, taking for instance the up yard, is for the train to pass into one of the reception loops with, say, 40 wagons, 10 of which require to be detached and 20 picked up. The control office telephones from the starting point the exact number of wagons on the train, and also the exact number to be detached, together with the destinations of the through wagons, and arrangements are made to have a suitable number of wagons in readiness on the arrival of the train, these being worked into position by the train engine and the pilot engine, turn and turn about, so as to keep the wagons that are picked up and those brought by the trains from the starting point for the same destination together, the whole performance occupying not more than a few minutes, after which the train is allowed to proceed on its journey.

This particular part of the line is heavily occupied during the day by passenger trains, and the control office has to keep in very close touch with the movements of trains operating at Cadder in order that full use shall be made of all the intervals between passenger trains and thus avoid delay as far as that is practicable. Two pilot engines are employed shunting continuously in the up yard, whilst a third is employed to relieve the other pilots for

Digitized by Google



CADDER DOWN YARD, FROM EAST OR EDINBURGH END.

Digitized by Google

engine duties and assist them with shunting during the night.

While Cadder Yard has been largely made use of for terminating long-distance trains arising in the north and the south, it is to be further utilised as a turning point for trains arising in the Edinburgh district, which previously made the double journey from Edinburgh to the Glasgow depôts, such as High Street and Sighthill. Arising from the introduction of the eight-hour day, trains are now turned at Cadder in order to reduce mileage, and securing for the trainmen the benefits of the shorter day. Similarly, it is now necessary to increase trip loads as between Cadder and the more important stations and docks in the Glasgow area, in order to keep trip engines working continuously to clear away the traffic brought forward by trains from the north, south and east, terminating at that point and hitherto worked direct to their respective destinations.

Whilst Cadder Yard is the legitimate gathering ground for traffic arriving in a large section of the western area, it was during the war period also used as a staging-forward point for considerable quantities of coal from the Fife district to the Glasgow munition and ironworks and the docks, and a continual service of trains was in operation for this particular traffic. Trains originating in Fife, and conveying full loads of coal and staging to Cadder, work back loads of empties on the homeward journey, the trains on the outward journey travelling via the Forth and Alloa bridges, while on the return journey they are booked by the same routes or diverted, at the instance of the control, according to the state of the lines at the particular times that the trains are running.

There are employed at Cadder Yard 36 shunters for train marshalling, 20 guards, six signalmen and six telephone boys. There are also two train control reporters. Work in the yard is performed under the direction of a yardmaster, with an assistant yardmaster for night work. Heavy work begins, as previously stated, at about 8 p.m. with incoming traffic from Glasgow, and the gravitating process continues from 8 p.m. to 4 a.m., although the greatest pressure is relieved after 2 a.m. It frequently occurs that a train arrives on the average every 9 minutes, with loads of 55 or 60 wagons each. There are two signal-boxes in the yard, known as Cadder East and Cadder West. Signalmen admit trains to the yard and signal them out, but they have nothing to do with the movements of trains, whilst the latter are operating within the confines of the yard itself, all movements being then conducted by hand-signalling and hand-operated points, spring points being used at the east end.

The down yard collects all traffic going to Glasgow, trains being made up for the various depôts, such as High Street, Sighthill and the docks, and then sent forward according to destination. In the case of wagons labelled for Glasgow only, the yardmaster decides, from the nature of the consignment and the name of the consignee, to which depôt the wagon or wagons shall be sent, doubtful ones being held in the yard until telephonic communications have passed. Parallel shunting is conducted in the down yard at Cadder, there being two inclines, one alongside the other, and to avoid any confusion No. 1 pilot engine shunts all its traffic for the roads numbered 7 to 12 into No. 7, which is the exchange siding, the traffic being afterwards distributed to the correct roads. A certain amount of traffic passes from the down to the up side of the yard and is forwarded on to branch lines, &c.

It will thus be seen that traffic from and to all parts of the United Kingdom and abroad passing over the North British Railway system is dealt with at Cadder Yard, and in the aggregate a very considerable volume is handled there in the course of a year.

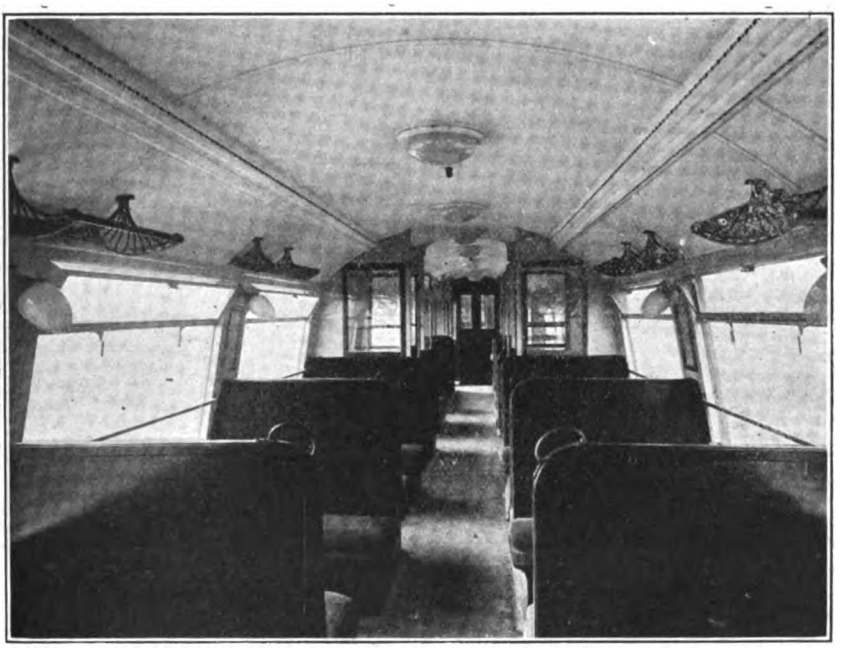
Digitized by Google

New Joint Electric Rolling-Stock.

LONDON & NORTH WESTERN AND LONDON ELECTRIC RAILWAYS.

ALTHOUGH electric trains have been working through between Elephant and Castle and Watford since April 16, 1917, the rolling-stock employed has been of a makeshift character, including Central London Railway motor cars designed for the Ealing and Shepherd's Bush line, and which will soon be required for their proper purpose, and London Electric Railway trailer cars. From the first it was, however, intended that joint rolling-stock should be employed, a compromise between the standard London and North Western Railway electric vehicles, and those of the London Electric Railway, in view of the different conditions, especially in regard to platform heights, which obtain on the tube sections and on the surface portion of the route.

These vehicles were designed and orders placed in 1914, but construction was necessarily deferred under war conditions and it is only since the termination of hostilities that they could be proceeded with. The new trains are now, however, being delivered, and at the end of March last a commencement was made with placing them in traffic at the rate of one every 10 days, until the set of 10 trains at present required for the service is available.



INTERIOR OF TRAILER CAR SHOWING SEATING AND LIGHTING ARRANGEMENTS.

Meanwhile, as each new train is added, the ordinary Bakerloo cars which it

Digitized by Google

replaces are being utilised to reorganise the service between the Elephant and Queen's Park. Between these points the "Bakerloo" is running five-car trains at present, and as the new trains come into service on the Watford extension line, the old cars will be used to build up complete sets of six-car trains over the whole system.

The "Bakerloo" line, serving so many main-line termini and carrying a very heavy "rush-hour" traffic in the mornings and evenings, has been one of the severest sufferers from post-war handicaps; and the provision of an additional 20 per cent. of accommodation on the ordinary service, through these additions to the rolling-stock on the extension route, will be an advantage equally welcome to its passengers and to its officials.

The new stock has been built by the Metropolitan Carriage, Wagon and Finance Corporation, to the joint design of the London and North Western and London Electric Railways, and everything has been done to make the trains as roomy and comfortable as possible. Externally they are painted in the well-known London and North Western colours and differ very little in appearance from the ordinary "tube" trains. But each car has a vestibule end, and both trailer and motor-cars are fitted with centre doors. The colour scheme for the interior of the car is a dark cream from the ceiling to the waist of the car. The seats are upholstered with red and black rep. The interior lighting consists of opal bowls fitted along the centre of the ceiling, and opal globe side-lights fitted between the windows. Heaters are fixed in the cars on account of the trains running in the open. Interior steel panels of the cars are painted a dark cream. The ceiling of the arch roof is of agasote, enamelled flat white. With regard to ventilation, in addition to the ordinary drop lights, an air duct with perforations runs the whole length of the car.

GENERAL VIEW OF MOTOR CAR.

Trains are made up of six cars, three motor and three trailer. In order to adjust the difference in platform heights between the "Bakerloo" and London and North Western Railway stations,

Digitized by Google

the floors of the cars of these new trains are 4½ in. higher than the ordinary tube stock. The number of seats in the motor cars is 36, and in the trailer cars 48.

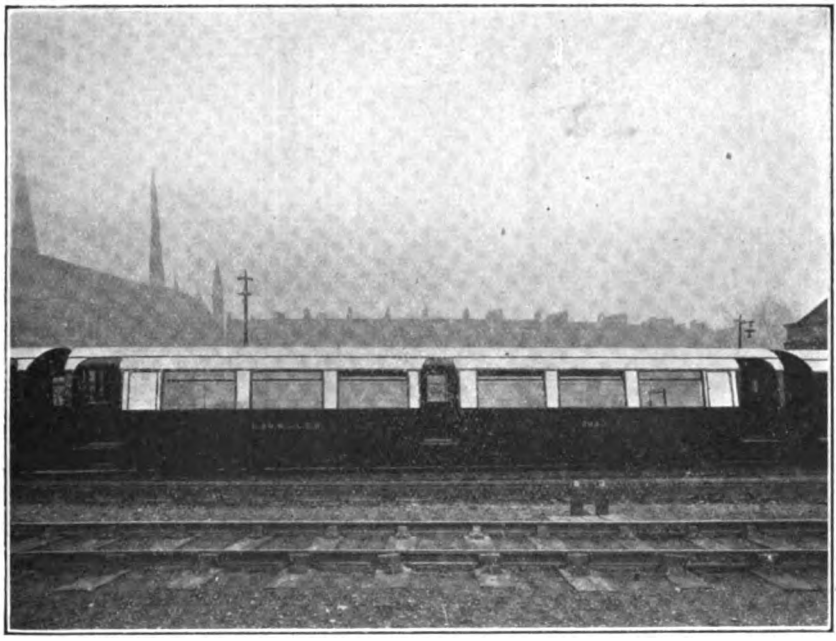
Leading dimensions are as follows :—

	Ft.	In.
Length overall	50	10
Width over body	8	8
Total height from rail ..	9	5½
Centres of bogies	34	0
Diameter of motor wheels ..	..	42
Wheel base of motor bogie ..	7	0
Diameter of trailing wheels ..	..	32
Wheel base of trailer bogie ..	6	0

Total weight of six-car train (unloaded) 161 tons 2 cwt.

Motor and trailer trucks are built up on the angle iron and plate principle with bolster laminated side and coil springs.

Locking and unlocking of the centre doors is under control of the gateman, the door itself being of ordinary type, checked by a standard design of spring, mounted under the car floor, Embodied in the pedestal which holds the mechanism for operating the end car doors, is a switch which controls the circuits governing the electric lock of the middle door. When the gateman opens the end car door, he automatically unlocks the middle door, and this fact is made plain by a red lamp becoming illuminated in the pedestal supporting the end door mechanism. When the end door is again shut it closes the circuits which lock the middle door, and a green lamp in the pedestal becomes illuminated. Should the end car door for any reason be shut and locked and the centre door has not properly fastened, the red lamp in the pedestal will continue to burn until the door has become properly locked.



TRAILER CAR WITH END AND CENTRE DOORS.

Brake equipment is Westinghouse, with quick-acting triple valves. Brake blocks are of unchilled cast iron. The brake rigging on the trucks is of the clasp type, this being the first rolling stock on the Underground fitted with double blocks.

All cars are fitted with emergency electric lights, supplied from accumulators carried on the motor cars, and arranged to switch on automatically in the event of the main supply of current failing at any time.

The control equipment is of the relay automatic type. The normal method

Digitized by Google

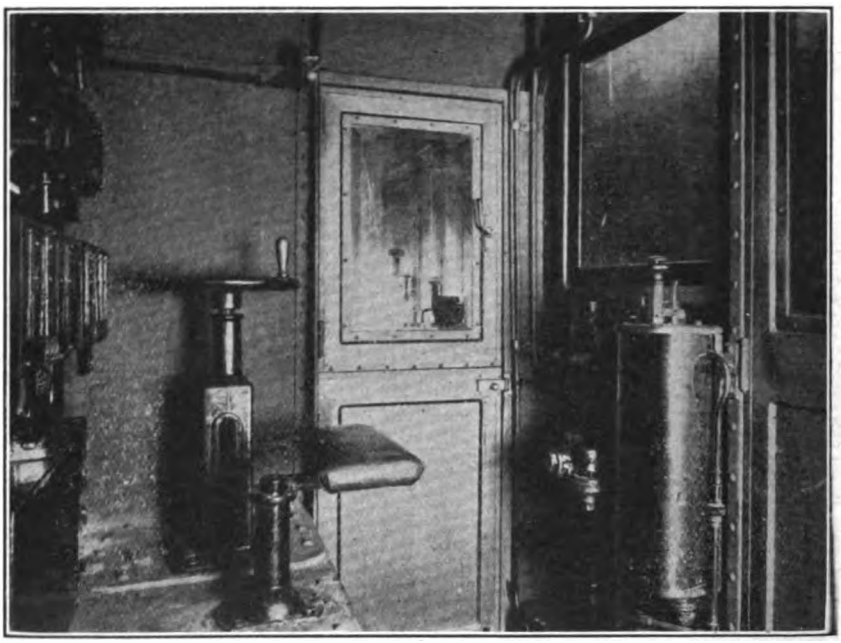
of operation with this system is to place the controller at once to the full parallel position when starting a train. The contactors are then picked up in their correct sequence by the current limit relay, which operates as soon as the motor current has dropped to a predetermined value.

The controller has four forward points and two reverse (series only), of which numbers two and four are running points, where all resistance is cut out. A useful provision in the control is that if in the course of the automatic notching up the controller handle is brought back to the first or third notch, as the case may be, the automatic closing of contactors is stopped, but those already closed are kept up.

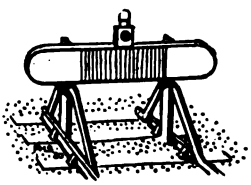
The working of the safety button on the controller handle differs from the London Electric Railway standard in that the safety button can be released, except when the handle is in the "off" position. If, however, the handle itself be let go, it flies back to the "off" position when current is instantly cut off and the brakes applied throughout the train.

Another safety device, which is now part of the standard London Electric Railway equipment, is the control circuit governor. By interrupting the control circuits, it prevents the train being driven forward unless the train pipe of the Westinghouse brake is charged with air and the tripcock is cut in.

Each motor car is fitted with two G.E. 212 motors of 240 h.p., geared for a free running speed of 40-45 m.p.h.



INTERIOR OF MOTOR-MAN'S COMPARTMENT.



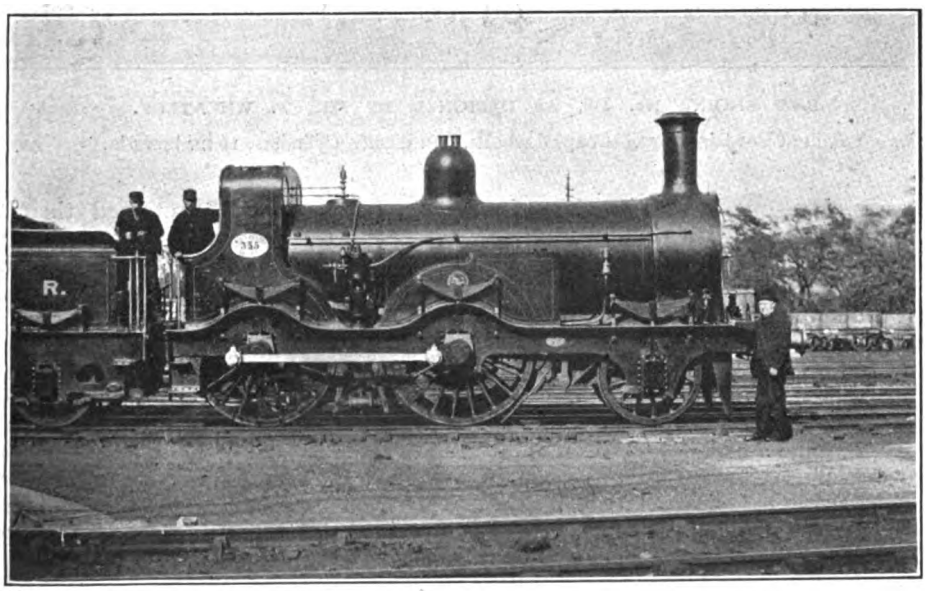
Digitized by Google

Locomotive and Train Working in the latter part of the 19th Century

NORTH BRITISH RAILWAY. [No. II.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE best expresses on the Edinburgh and Glasgow section were run in connection with the East Coast trains to and from King's Cross, and conveyed through carriages between London and Glasgow (Queen Street). The 10 a.m. from King's Cross at that time arrived at Edinburgh at 7.30 p.m., and the through carriages formed part of the fastest down train from Edinburgh to Glasgow, which left at 7.40 p.m., and reached Glasgow at 8.50 p.m., with stops at Polmont and Cowlairs. The 9.15 a.m. up train reached Edinburgh at 10.25 a.m. without a stop, but slipped a carriage at Polmont. As against the two stops of the best down train, the up train had the Cowlairs incline to negotiate. These trains were generally worked by the Beyer-Peacock single engines. Between Edinburgh and Dundee no fast service was possible. There were neither the Forth nor the Tay bridges, and the ferries were an unmitigated inconvenience. The best train from Edinburgh to Dundee took 3 hr. 12 min. over the business—including the ferry crossings at Burntisland and Tayport, and to make matters more pleasant, it started from Edinburgh at the inviting hour of 6.25 a.m.

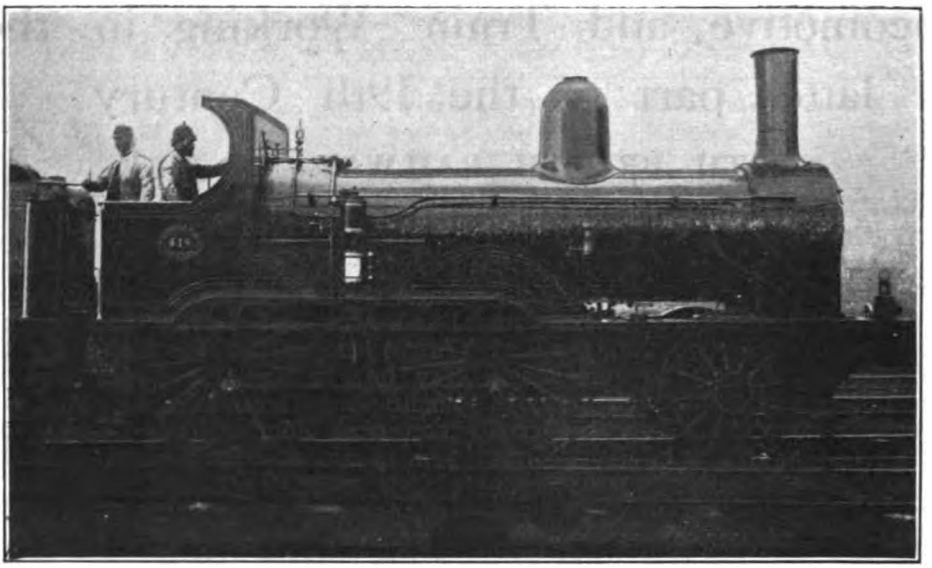


2-4-0 ENGINE No. 355 (CLASS 349—356) AS REBUILT.

Designed by Mr. S. W. Johnson for the Edinburgh & Glasgow Railway. Built at Cowlairs, 1862-7. Coupled wheels, 6 ft. diam. Cylinders, 16 in. by 22 in. (later 17 in. by 24 in.).

The 2-4-0 passenger engines were of several classes, nearly all of which had 6 ft. wheels Of these, the 90, 341, and 382 classes had inside bearings for the coupled wheels and outside bearings for the leading wheels. The oldest engines were Nos. 90 to 95 (illustrated last month, page 227), with 16 in. by 20 in. cylinders. These had been built

Digitized by Google



2-4-0 ENGINE No. 418, AS DESIGNED BY MR. T. WHEATLEY.

Built at Cowlairs, 1873. Coupled wheels, 6 ft. diam. Cylinders, 16 in. by 24 in.

by Messrs. Neilson & Co., in 1860, for the old North British Railway, and several of them were rebuilt in 1874 by Mr. Wheatley. They were usually employed under Mr. Drummond on various branch lines, one of them working the Carlisle and Silloth branch for some time. Another class, but of similar type, was numbered 341 to 346 (see page 228, April number), and had been built in 1865 by Dübs & Co., also for the North British These engines, of which the cylinders were 16 in. by 20 in., were somewhat neater looking than the 90 class, and had curved domes over the flush fireboxes.

Nos. 382 to 393 (illustrated on page 229, last month), also with 6 ft. wheels, but with cylinders 16 in. by 22 in., had flush domeless boilers. I am under the impression that these were designed by Mr. S. W. Johnson for the Edinburgh and Glasgow Railway, just before this line was absorbed by the North British, but they were delivered by Neilson & Co. 1866-7 to the latter railway. They had 881½ sq. ft. of heating surface, and weighed 30¾ tons in working order. Two of them, 384 and 388, were altered by Mr. Wheatley, who reduced the diameter of the driving wheels to 5 ft., and they ran thus for some years. Unlike the 341 class, which retained their old boilers until they were broken up, the 382 class were all rebuilt by Mr. Holmes, Nos. 382 and 383 in 1888, and all the others in 1891, and were at work until comparatively recently.

A well-known class which differed from those mentioned above were Nos. 349 to 356. These had double frames and outside cranks, and owed their origin to the designs of Mr. S. W. Johnson, who from 1864 to 1866 was locomotive superintendent of the Edinburgh and Glasgow Railway. These engines were all built at Cowlairs works at various dates from 1862 to 1867, and in their original condition had 6 ft. wheels and 16 in. by 22 in. cylinders. A few of them were reboilered in 1882 by Mr. Holmes, when they retained the original cylinders, but at a later date all of them were rebuilt and enlarged, the new cylinders being 17 in. by 24 in. They were always considered to be excellent engines and did a lot of useful hard work on the North British. During the early "eighties," Nos. 351 and 354 were stationed at Dundee and ran to Aberdeen and back. Another of the class was stabled at Aberdeen and worked in the opposite direction to Dundee and back. Others were to be found on their old line

Digitized by Google

between Edinburgh and Glasgow. There was also an engine, No. 38, of very similar appearance and of the same general dimensions, which, after it had been rebuilt in 1894, became practically one of the 349 class. This engine was for a long time stationed at Dundee during the early "eighties." The 349 class were transferred from the Edinburgh and Glasgow line to Dundee, on the opening of the Arbroath and Montrose line.

Finally there were eight 2-4-0 passenger engines built at Cowlairs in 1873 by Mr. Wheatley, which had inside bearings for all the wheels. The cylinders were 16 in. by 24 in. and the coupled wheels had a diameter of 6 ft. They have been rebuilt and enlarged more recently, with 17 in. by 24 in. cylinders and most of them are still at work in the duplicate list numbered above 1200. Of these, No. 418 was stationed at Aberdeen at one time to work in the Dundee link, whilst 427 was spare engine at Dundee. The others were frequently to be seen on the Edinburgh and Glasgow slow trains. Mr. Drummond gave names to five of them as follows :—

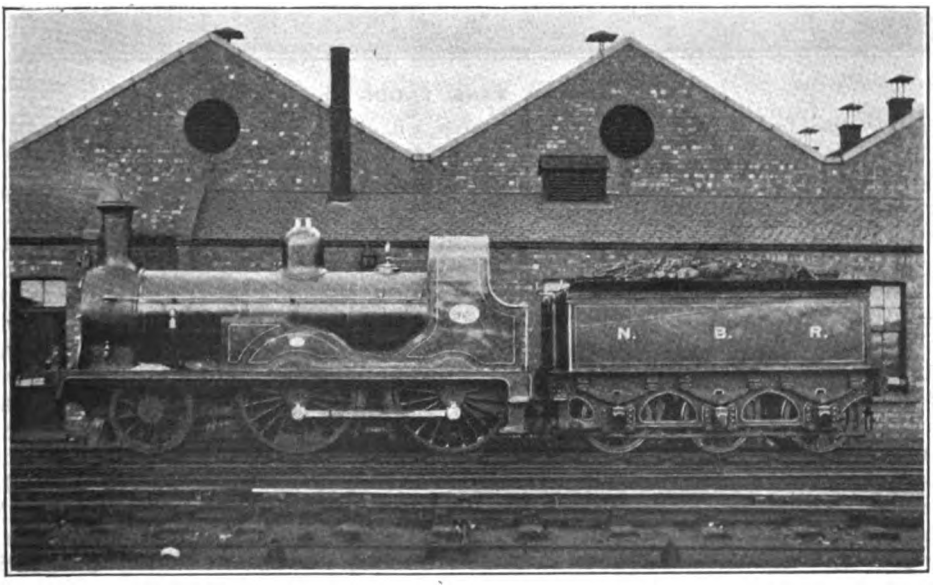
418 *Bonnybridge.*
419 *Gogar.*
424 *Dunfermline.*
427 *Linlithgow.*
428 *Ratho.*

Mr. Holmes afterwards removed the names on the departure of Mr. Drummond to the Caledonian Railway.

There was also another class, Nos. 233 to 239, which should have been mentioned previously. These were Edinburgh and Glasgow engines with 6 ft. wheels and outside bearings for the leading wheels only. Of these, Nos. 233 and 234 (1861), and Nos. 237-8 (1859), came originally from the works of Beyer-Peacock & Co., and were rebuilt in 1881-2 by Mr. Drummond with 16 in. by 22 in. cylinders. The other three engines were very similar, but had 16 in. by 20 in. cylinders, and had been built at Cowlairs 1865-7. In Mr. Drummond's days, some of them were often to be seen on the line connecting Edinburgh and Glasgow, via Bathgate, and were then named as follows :—

233 *Stirling.*
234 *Kincardine.*
235 *Dunbar.*
236 *Aberdeen.*
237 *Alexandria.*
238 *Bathgate.*
239 *Falkirk.*

The above account includes all the principal 2-4-0 engines of the North



2-4-0 ENGINE No. 425 (418 CLASS), AS REBUILT BY MR. HOLMES, 1890.

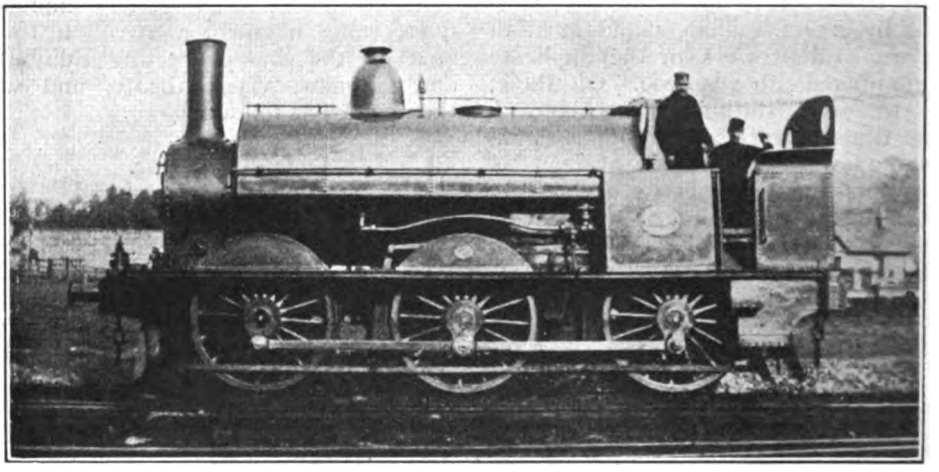
Coupled wheels, 6 ft. diam. Cylinders, 17 in. by 24 in.

Digitized by Google

British. There were about half-a-dozen other engines of isolated classes, of which Nos. 231 and 232 were double-framed engines with 5 ft. 6 in. wheels and 15 in. by 20 in. cylinders, which had been converted from single engines of the well-known Sharp's type, built for the Edinburgh and Glasgow Railway in 1854.

A very handy class of engine consisted of the Edinburgh and Glasgow Railway "mixed traffics." These were North British Railway Nos. 317 to 334, 0-4-2 engines, with 5 ft. wheels and 16 in. by 22 in. cylinders. Twelve of these engines were built by Beyer, Peacock & Co., six in 1859 and six in 1861, and were probably intended mainly for goods traffic. Mr. S. W. Johnson found that they were such useful engines that he constructed six more of them, Nos. 329 to 334, at Cowlairs works in 1864. The "mixed traffics" originally had domeless boilers, like most of the other Edinburgh and Glasgow engines, and the trailing wheels under the footplate had outside bearings, the coupled wheels in front having inside bearings only. These engines developed into branch line passenger engines, and Mr. Drummond rebuilt a number of them in 1882, most of the others being similarly rebuilt at a later date by Mr. Holmes. Most of those rebuilt by Mr. Drummond were named by him, generally after stations on the branches upon which they worked, such as 320 *Balfron*, 321 *St. Ronans*, 325 *Peebles*, etc.

Tank engines for passenger traffic were in use on the North British from 1861, when Mr. Hurst, then chief locomotive superintendent, designed ten small 0-4-2 back tank engines for local traffic in the Edinburgh district. These locomotives, Nos. 96 to 99 and 103 to 108, were built at St. Margaret's works between 1861 and 1864, but were very small undersized engines with 4 ft. 9 in. coupled wheels and cylinders only 12 in. by 18 in. They ran until 1878-1881, when Mr. Drummond broke them up and replaced them by tank engines of his own design, which will be mentioned subsequently.



0-6-0 PASSENGER TANK ENGINE, No. 228.

Designed by Mr. T. Wheatley. Coupled wheels, 5 ft. diam. Cylinders, 16 in. by 24 in.

Mr. Wheatley's passenger tank engines were of a very much larger pattern, all of them being 0-6-0 saddle tanks, very much after the style of the similar engines used by Mr. Jenkins on the Lancashire and Yorkshire Railway. There were about 18 of these engines, all of which were built at Cowlairs between 1870 and 1873, having 5 ft. wheels and 16 in. cylinders. Some had a stroke of 22 in., though several had a 24 in. stroke. For branch line passenger traffic they were subsequently replaced by Mr. Drummond's and Mr. Holmes's later tank engines and relegated to piloting duties at various important stations.

The goods engines require but a passing mention. Nearly all of them were of

Digitized by Google

the 0-6-0 type with inside bearings, of which those built for the North British line proper during Mr. Hurst's superintendency by Stephenson & Co., and Dübs & Co., had 5ft. wheels and 15½ in. by 24 in. cylinders. Mr. Wheatley's goods engines of the period 1867 to 1874 had 5 ft. wheels and 17 in. by 24 in. cylinders. The earlier ones came from the works of Neilson & Co., and Dübs & Co., but the later ones were all built at Cowlairs and formed one of the standard classes on the line. For mineral traffic a somewhat similar class was built at Cowlairs with 4 ft. wheels and 16 in. by 24 in. cylinders. There were also about a dozen engines with double frames which were built at St. Margaret's works 1864 to 1869.

Mr. Dugald Drummond succeeded Mr. Wheatley from the beginning of 1875, and shortly afterwards had to devote his attention to the problem of providing much more powerful engines necessitated by the impending opening of the new Midland route between Settle and Carlisle, and the consequent heavy traffic to be expected over the North British Waverley route between Carlisle and Edinburgh. This section of the North British had really not been constructed as a main line express route, but, as mentioned previously, was made as a local railway between Edinburgh and Hawick, to which was afterwards added the Border Union Railway from Hawick to Carlisle. Consequently, the question of curves and gradients did not receive the same amount of careful consideration that it probably would have had if the future importance of the railway had been fully realised. Leaving Edinburgh for Portobello there is a fall of 1 in 78 for 1¼ miles, and from Portobello there follows a very stiff 15 mile pull to Falahill, of which eight miles rise at the rate of 1 in 70. From Falahill (850 ft.), there is a long descent to Galashiels, mostly at 1 in 150 to 1 in 120. The next 6½ miles beyond Galashiels are not difficult, but then follows a six mile rise at 1 in 120 to 1 in 200 from St. Boswells, succeeded by a six mile fall to Hawick. From Hawick there is another extremely severe ascent for 11 miles, most of which is at the rate of 1 in 75 to 1 in 100 to the summit about 1½ miles on the Edinburgh side of Riccarton Junction (955 ft.), after which there is a steep descent for 9½ miles, eight of which are at 1 in 75, until within one mile of Newcastleton, followed by a more moderate fall of 1 in 200 to 1 in 300 for four miles, and a rise of two miles from Kershopefoot. Of the remaining portion to Carlisle (98¼ miles from Edinburgh) there is a fall for eight miles, four of which are at 1 in 100, and the last 11 miles are of an undulating character. This is certainly the hardest express route in the country, especially for heavy trains, and presented a difficult problem to the new locomotive superintendent, for there were certainly no engines then at work on the North British which were capable of coming anywhere near the requirements to be met. It is true that for a few weeks after the Midland service was inaugurated, in May, 1876, Wheatley's bogie engines, such as No. 421, previously described, were tried, but with what amount of success I am unable to say.

Mr. Drummond's first express engines consisted of two handsome "singles" of the 2-2-2 type for working the fastest trains between Glasgow and Edinburgh. These were Nos. 474 and 475, named *Glasgow* and *Berwick* respectively, and constructed by Neilson and Co. in 1876. The driving wheels were 7 ft. in diameter, carrying wheels 4 ft. 6 in. diameter, and the cylinders were 17 in. by 24 in. The wheelbase was 15 ft. 6 in., equally divided. The boiler had the large diameter for those days of 4 ft. 4 in. outside, and provided a total heating surface of 1,133 sq. ft., towards which the firebox contributed 93 sq. ft. The pressure was 140 lb., and weight on the single drivers was 15 tons 4 cwt., and the total weight 37 tons 18 cwt.

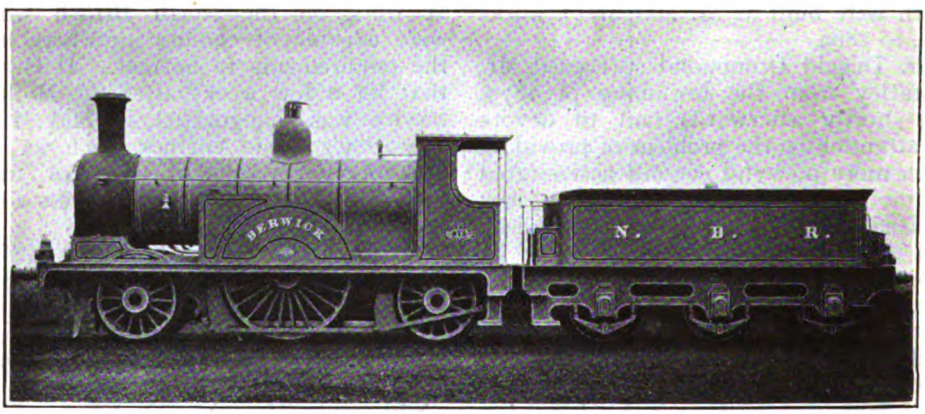
It will be noticed at once that these two engines bore a remarkably close resemblance to Mr. Stroudley's singles of the "Grosvenor" and "Stephenson" classes on the Brighton Railway. Mr. Drummond had been works manager at Brighton under Mr. Stroudley when the "Grosvenor" was designed and built, and except in one important particular, his North British practice was a faithful copy of that of Mr. Stroudley in nearly

Digitized by Google

all his engines. The general design, the cabs, the domes placed on the back ring of the barrel with the safety valves on them, and the details of the motion might all have emanated from Brighton works, though Mr. Drummond adopted the Ramsbottom type of safety valves in place of those with spring balances.

Further, Mr. Drummond also went so far as to adopt the system of place names for his engines after Stroudley's Brighton method, and he even carried it further than the latter in that the engines were almost invariably named after towns and places situated on the route over which they usually worked. It frequently resulted that, when the station and route of an engine were changed, the name had also to be altered to suit the new scenery. This seems in all conscience to have been the acme of unpractical locomotive nomenclature, and when Mr. Holmes succeeded Mr. Drummond in 1883, the place names were promptly wiped off all the engines. Mr. Drummond's North British venture with place-names was the only one of the sort upon which he embarked, for on going over to the Caledonian Railway, he contented himself with numbers only for his engines, with two special exceptions.

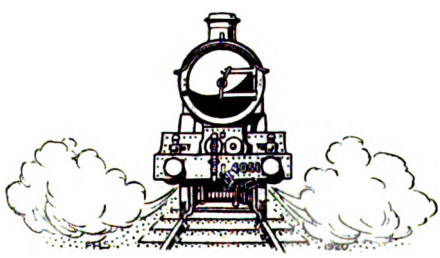
The two 7 ft. singles, Nos. 474 and 475 usually worked the morning expresses from Glasgow to Edinburgh, and I think that one of them then ran forward to Berwick with a slow train. They were at one period, 1876-1883, almost invariably to be found on the 7.10 p.m. and 9.10 p.m. expresses from Edinburgh to Glasgow, which had connections with and through carriages from the 10.0 a.m. and 10.35 a.m. trains from King's Cross. Both of these trains from 1876 took 70 min. between Edinburgh and Glasgow, with two stops.



2-2-2 ENGINE, No. 475 "BERWICK" (CLASS 474-5).

Designed by Mr. D. Drummond and built by Neilson & Co., 1876. Driving wheels, 7 ft. diam. Cylinders, 17 in. by 24 in.

(To be continued.)



Digitized by Google

The One Remedy for Railway Congestion.

Provision of additional wagons would not necessarily solve the difficulties of railway traffic working. It is in the better handling of the wagons and in improved methods of operation that relief is to be sought.

By CHARLES TRAVIS, M.Inst.T.

MUCH has been written on the subject of railway congestion. The fact that congestion is, unfortunately, somewhat pronounced has given certain sections of the public and the daily press a useful peg on which to hang criticisms of the Ministry of Transport and the railway administrations. If the criticism were at all constructive in character it would not be unwelcome, but since the only remedy suggested by these "experts" is the provision of additional wagons—and that is only half the solution—one is forced to the conclusion that the critics are not very well acquainted with railway matters.

It is not very long ago that the special correspondent of a certain daily paper definitely asserted that the provision of additional wagons was essential because he had observed many large terminals overwhelmed with wagons standing underload, and had not noticed many wagons on his journeys over the main lines! This observer was, however, confusing cause and effect. The terminals in question were admittedly congested from the fact that they were obviously receiving traffic beyond their capacity to handle currently, but that by no means proved that additional wagons were necessary. What it does prove, however, is that terminal congestion is directly responsible for the relative shortage of wagons, and once this can properly be cleared the raising of the wagon mobility ratio that will ensue is bound to do much to solve the problem of wagon supply.

Speedy Clearance of Wagons is Essential.

In brief, it comes to this: Every wagon despatched on a journey with a normal turn-round of, say, four days, if lost to active service by undue detention at a terminal, is enhancing its immobility ratio and consequently aggravating the relative shortage of wagons. Such increased immobility of wagons, when multiplied by thousands, appears to indicate that more wagons are urgently required. As a fact, however, the imperative need is for the more speedy clearance of the available wagons, and this is one of the problems of the moment.

In my article on "The Railway Traffic Problem," published in the February issue of THE RAILWAY MAGAZINE, I outlined some of the new methods introduced in the attempt to relieve terminal congestion, and in dealing with the same point stated: "It is confidently expected that the application of higher demurrage charges will impel traders and others to clear wagons more promptly, and thus increase the number of traffic units available for haulage." It is interesting to note that these expectations have been realised, as the Minister of Transport has recently announced that "very gratifying results have followed the increase of the demurrage charges on railway companies' trucks, which became operative on January 1." The demurrage figures for February are now available, and indicate that, as compared with December last, wagon detention has decreased by 42 per cent., this representing a saving of over 150,000 wagon-days. Put another way, this improved clearance of wagons serves to prove the accuracy of the statement that once the terminals are freed from their difficulties the wagon stock will suffice to meet all reasonable requirements; 150,000 wagon-days saving is equivalent to the placing in traffic for the month of an additional 5,000 wagons, a fact emphasising the important effect that detention plays on the shortage of wagons.

To bring this fact more frequently

Digitized by Google

before the notice of those interested, large "Release Wagons Early" posters are being affixed to goods wagons. The posters explain that congestion is largely due to delay in the release of wagons, and that while new wagons are being built they will be useless so long as yards and sidings are blocked. Early clearance of loads is, therefore, vitally urgent, and traders, carters, and all who deal with wagons are urged to speed-up the "turn round" of wagons to keep British trade moving. All such efforts to induce the cordial co-operation of traders are to be welcomed, as the detention of wagons under load is one of the principal factors in congestion. This is the special fact to be driven home. If the present available wagon stock were doubled it would not necessarily mean that transits would be more expeditious. The governing factor is the clearance of the traffic at terminal points; it is only by improvement there that congestion will be relieved, and the quicker release of wagons, and the consequent raising of their mobility ratio, is the first necessity in the interest of expeditious and adequate traffic working.

Handling of Traffic at Terminals.

Free traffic movement is governed absolutely by the capacity of tracks and terminals. Track capacity, in its turn, is largely governed by the ability of terminals promptly to handle traffic. While transits to-day are somewhat less expeditious than in pre-war days, it cannot effectively be argued that track capacity, as distinct from terminal capacity has been the cause of the congestion which, happily, appears to be dwindling.

The adequate arrangement of terminal work is, therefore, of considerable importance. It is no use at all getting traffic to a terminal if the clearance facilities at the point are incapable of dealing with the traffic in due volume. The relationship of the cartage department to the goods department proper must, therefore, be a very close one. I have personally seen a good deal of congestion caused primarily by faulty arrangement of the cartage facilities and a somewhat unwise disposition of traffic arrangements at terminals. This concerns not merely traffic for public cartage but also traffic for delivery by railway services. While the traders have undoubtedly done much to bring about congestion by detaining traffic in wagons because it was cheaper so to do than to pay the high charges for cartage to outside depôts, it must freely be admitted that the railway companies themselves are by no means clear of censure in the matter. The lack of a properly framed traffic regulation scheme has, in some cases, brought about a troublesome state of affairs which has frequently caused congestion and the wagon detentions that necessarily follow.

There is, in my opinion, need for more scientific arrangement at railway terminals. The wagon records are not altogether as satisfactory as they might be, and due care is not always taken to handle traffic with the promptitude that is desirable. Agent's demurrage, which is the paper charge raised against the depôt for undue detention of wagons, should more stringently be considered before clearance authority is given, for it would often be found that a considerable amount of the detention might have been avoided by more careful management.

The disposition of traffic in the unloading operations could also, in some cases, be much improved. The ideal arrangement is, of course, to transfer traffic direct from wagon to road vehicle, but since this cannot always be done it is of importance to sectionalise the traffic in such a manner that minimum sorting is necessary in the loading up of the road vehicles. This is a point not sufficiently considered at certain terminals, and I know of instances where traffic has been unloaded indiscriminately on to a bank some 50 yds. long without any attempt at classification in the operation. This is quite wrong. All such defective practice helps towards a state of congestion, and should ruthlessly be stopped.

Many terminals also require more modern equipment if they are to improve their capacity to the required extent. Their crane installations and transferring devices are frequently old-fashioned and require renewing with modern arrangements. Another point is that terminals are too frequently utilised as sidings for traffic that cannot be handled within a reasonable period or, alternatively, for loaded traffic that should promptly be

Digitized by Google

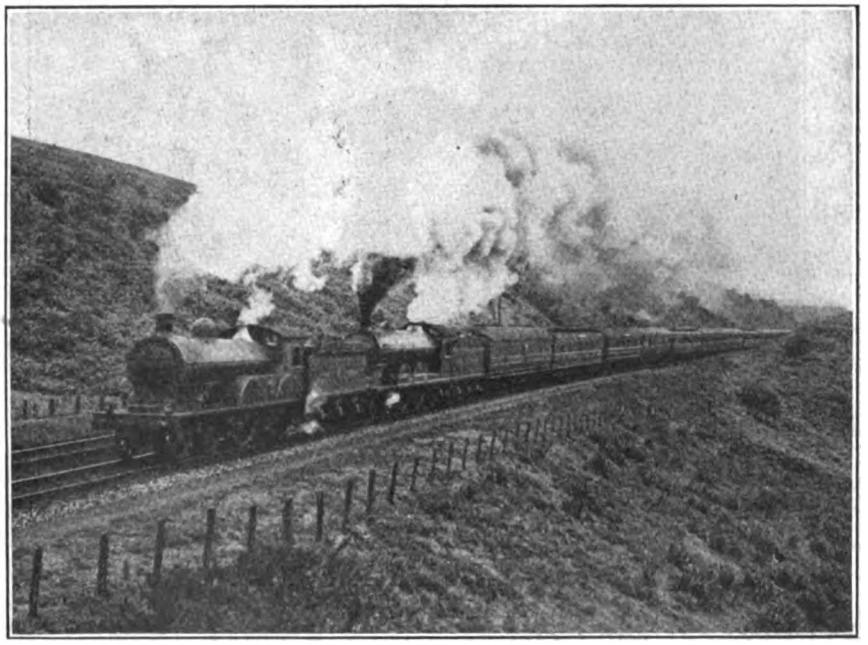
taken out. It is probable that much of the inconvenience inseparable from this arrangement will be overcome in due course, for the present tendency is to avoid this wastage of accommodation at terminal points by the adoption of a yard to yard method of working, and the consequent passing in and out of the terminal of traffic as required..

THE RELIEF OF CONGESTION.

It is instructive to note that the "gratifying results of the increase of the demurrage charges" announced by the Minister of Transport were accompanied by indications that congestion was being relieved at many points. This serves to show that the great necessity is the speedy clearance of wagons, and it is of the highest importance that every possible step should be taken to extend this as much as possible. To accomplish this desirable end there is need for the closest co-operation between railways and traders. If all unite in developing to the full the many excellent schemes recently introduced to relieve congestion and in helping each other in the highest degree, the press cry of railway congestion will die of inanition, and all will once more be right with the railway world.

As the pre-war wagon stock is fully placed into service again—a great improvement in the repair work has recently been manifested—and the various improvements to terminal and track facilities are brought into use it may confidently be expected that congestion and its attendant difficulties will be eradicated, and British railways will once more attain their pre-eminent position in possessing the most speedy and effective freight train service in the world.

DOUBLE-HEADING ON THE NORTH EASTERN RAILWAY.



Photo] [*F. E. Henderson.*

EAST COAST EXPRESS ASCENDING COCKBURNSPATH BANK.

4-4-0 engine of class R piloting three-cylinder 4-4-2 engine of class Z.

Digitized by Google

Photo.] [*Swaine.*

MR. P. C. TEMPEST, C.B.E.,

GENERAL MANAGER,

SOUTH EASTERN & CHATHAM RAILWAY.

Digitized by Google

The Railway Portrait Gallery.

Mr. PERCY CROSLAND TEMPEST,

General Manager, South Eastern & Chatham Railway.

As announced in the April RAILWAY MAGAZINE, Mr. P. C. Tempest, the Chief Engineer of the South Eastern and Chatham Railway, succeeded on April 1, Sir Francis H. Dent, as General Manager. He still retains his position as Chief Engineer.

Our readers are aware from the biographical particulars given last month that Mr. Tempest entered the service of the South Eastern Railway after experience on the London and North Western Railway. He was appointed Permanent Way Engineer in 1895, and became Chief Engineer upon the amalgamation of the South Eastern and London and Chatham and Dover Railways in 1899.

During the 25 years Mr. Tempest has been responsible for the maintenance of the railway he has accomplished a complete change in the efficiency of the track. When he was appointed the South Eastern track consisted of double-headed rails of light section throughout, whilst out of London nearly all the main line under-bridges were of the cast iron pattern. He immediately set about the task of remedying this out-of-date state of affairs, with the result that under his energetic sway the whole of the main lines were re-laid with heavy section bull-head rails, the road re-sleepered, re-chaired and provided with new ballast throughout, all the cast iron bridges were renewed in steel so as to carry the heavy loads of modern locomotives, curves were flattened and pinching points which restricted the loading gauge removed, so as to enable longer and wider stock to be used. To-day, after many years of persevering work, the main lines are all up to standard practice.

Mr. Tempest has likewise carried out many important works, the principal of which are the construction of the Bexley Heath Railway, the widening of the lines in the London district as far as Orpington, the reconstruction of the opening bridge over the Swale River, the widening of the railway at Rochester, the erection of a handsome edifice in place of the old wooden building at Victoria Station, and the provision of the new marine station at Dover.

During the war the wide experience of Mr. Tempest enabled him to undertake very important services. On the outbreak of hostilities, as agent to the Northern of France and Belgian State Railways, he supervised the purchase and inspection of large quantities of rails, bridgework and other railway equipment. This did not, however, embrace all the work which he undertook for war purposes apart from the South Eastern and Chatham Railway, as when the War Department decided to extend the military base at Boulogne in 1914, which necessitated large railway extensions at the port, he was invited to carry out the necessary civil engineering works there, which comprised the laying down of about 10 miles of sidings, surfacing areas for hangars, the construction of a R.E. park and several miles of metalled roadways. The land on which these works were constructed is of a waterlogged and loose character, and to make it suitable for the purpose an extensive drainage system had to be constructed.

In 1918 Mr. Tempest received the honour of the C.B.E. for his services during the war, and he was made an Officer of the Order of Leopold by the King of the Belgians in 1919. In 1916 he was appointed Engineer to the Channel Tunnel Company, since when he has been busily engaged in the furtherance of this important international project.

Digitized by Google

The Most Excellent Order of the British Empire.

A LONG list of promotions in, and appointments to the Order, conferred by His Majesty the King in recognition of services rendered in connection with the war, was recently issued, and many well-known railway names are included. In some instances acknowledgement is primarily of work done apart from direct railway service, in view of the fact that so many railway officers were "lent" to the Government in various leading capacities; but a good proportion receive the honour in recognition of the important shares taken in conducting railway traffic efficiently and in the interests of the nation during its time of emergency. There are far too many names to permit of detailed reference to all concerned, every grade of the railway service and associated interests being included, and we, therefore, tender our congratulations collectively to those who have been thus honoured by His Majesty. It will, however, be in order to refer to the principal promotions and appointments, in so far as they relate to gentlemen who are well-known in the railway world and who occupy leading positions.

The highest distinction in the Order is that of Knight Grand Cross (G.B.E.), and this is conferred upon the Right Hon. Viscount Chilston, Deputy-Chairman of the London, Chatham and Dover Railway Company, and a member of the South Eastern and Chatham Railways Managing Committee, and upon Brig.-General Sir Alexander Gibb, now Director-General, Civil Engineering Department, Ministry of Transport. In the next division, Colonel W. C. Wright, C.B., a director of the Port Talbot Railway and Docks Company, is created a Knight Commander (K.B.E.).

It is, however, among the new commanders of the Order (C.B.E.) that so many chief railway officers are found. Mr. E. A. Prosser, General Manager, Taff Vale, Rhymney and Cardiff Railways is thus honoured. Chief goods managers include Mr. H. Evans (late M.R.), Mr. S. H. Hunt (L. & N.W.R.), Mr. C. A. Roberts (G.W.R.), Mr. J. Robinson (G. & S.W.R.), Mr. J. Rostern (G.C.R.), Mr. H. A. Sire (L.B. & S.C.R.), and Mr. J. Smeal (indoor, L. & S.W.R.). Major W. J. Grinling, late Chief Traffic Manager, G.N.R., is honoured with the C.B.E., while Superintendents of the Line include Lieut.-Colonel W. Clow (G.C.R.), and Mr. R. H. Nicholls (G.W.R.). Mr. H. E. Blain, the well-known operating manager of the "Underground" group of transport agencies also receives this distinction, while operating superintendents are represented by F. V. Russell, O.B.E. (G.E.R.), and Major C. H. Stemp, O.B.E. (N.B.R.). Among the Chief Engineers are: Mr. J. Briggs (M.R.), Major C. J. Brown (G.N.R.), Mr. W. Melville (late G. & S.W.R.), Mr. A. Newlands (H.R.), Major A. W. Szlumper (L. & S.W.R.), Mr. E. F. C. Trench (L. & N.W.R.).

On the rolling-stock side are; Chief Mechanical Engineers, Mr. H. N. Gresley (G.N.R.), Mr. G. Hughes (L. & Y.R.), Mr. W. Pickersgill (C.R.), Mr. W. P. Reid (late N.B.R.), Mr. J. G. Robinson (G.C.R.); Deputy and Assistant Chief Mechanical Engineers, Mr. J. E. Anderson (M.R.), and Mr. A. C. Stamer (N.E.R.); Carriage Superintendents, Mr. R. W. Reid (M.R.), and Mr. A. R. Trevithick (L. & N.W.R.), and Mr. F. W. Marillier, O.B.E., Manager, Carriage and Wagon Works, (G.W.R.).

Railway Accountants include the following: Mr. C. L. Edwards (Chief, G.N.R.), Mr. F. G. Evans (Audit, L. & N.W.R.), and Mr. J. C. Isaac (Chief, L. & N.W.R.). Mention may also be made of Mr. A. J. Brickwell, (Surveyor, G.N.R.); Mr. A. B. Cane, Secretary, Railway Companies' Association, and Mr. E. G. Wilson, Traffic Manager, Uganda Railway.

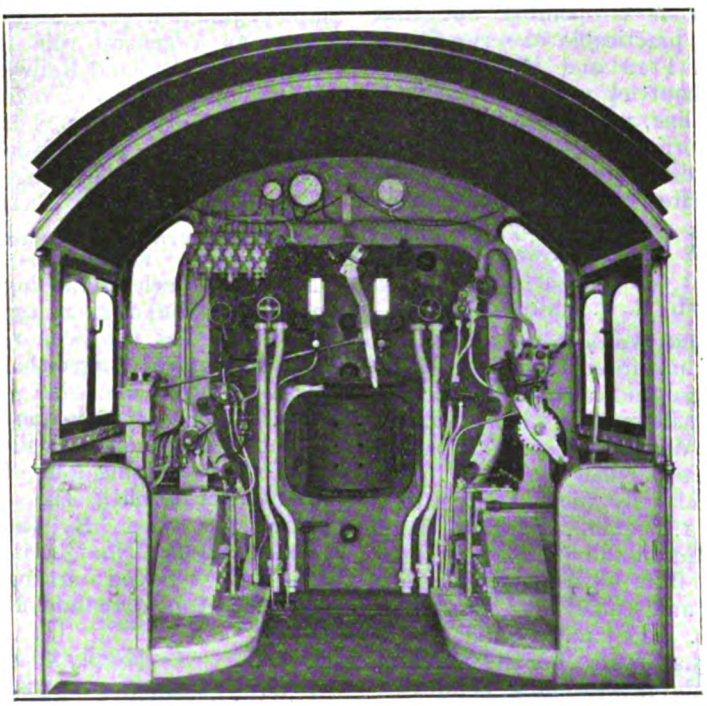
Departmental officers who are created Officers of the Order (O.B.E.), include the following:—

Mr. J. E. Abbott, Assistant to Superintendent of the Line, G.N.R.; Mr. W. C. Acfield, Signal Superintendent, M.R.; Mr. J. Ballantyne, Chief Goods Manager, C.R.; Mr. W. Buckmaster, Chief Clerk to General Manager, L. & S.W.R.; Mr. J. C. Christie, Chief Goods Manager, N.B.R.; Mr. William Clower, Chief Assistant to General Manager, M.R.; Mr. A. Collinson, Assistant General Superintendent, N.E.R.; Mr. W. Crozier, Assistant Superintendent of the Line, C.R.; Mr. T. Downes, Chief Assistant to General Manager, G. & S.W.R.; Mr. G. Ellson, Assistant to Chief Engineer, S.E. & C.R.; Mr. C. W. L. Glaze, Works Manager, G.E.R.; Mr. S. Hauxwell, late Assistant Superintendent of the Line, L. & Y.R.; Mr. B. Healey, Deputy Assistant Goods Manager, L. & Y.R.; Mr. G. T. Hedge, Outdoor Goods Manager, L. & S.W.R.; Mr. J. Ingram, Secretary, Irish Branch, Ministry of Transport; Mr.

Digitized by Google

K. Kerr, Assistant to General Manager, N.E.R.; Mr. F. H. London, Assistant to General Manager, G.N.R.; Mr. H. F. Loney, Chief Goods Manager, M.R.; Mr. C. McDowall, Chief Assistant to Goods Manager, G. & S.W.R.; Mr. H. P. Maynard, Assistant to Chief Engineer, G.W.R.; Mr. Harry Powell Miles, Assistant Engineer, M.R.; Mr. J. P. Monkhouse, Assistant to Chief Goods Manager, G.W.R.; Mr. J. Murray, Superintendent of Freight, M.R.; Mr. A. Oldham, Assistant Superintendent of the Line, G.C.R.; Mr. W. G. Pape, M.B.E., Chief Clerk to General Manager, L.B. & S.C.R. Mr. Haydon Parker, Manager, Carriage Works, G.E.R.; Mr. G. H. Pearson, Locomotive Carriage and Wagon Works Manager, S.E. & C.R.; Mr. J. Pike, Director of Rates and Charges, Ministry of Transport; Mr. P. H. Price, Secretary, Railway Clearing House; Mr. H. J. Rudgard, Assistant Engineer for Maintenance, N.E.R.; Mr. F. Ruffell, Rolling-Stock Superintendent L. & N.W.R.; Mr. J. Sayers, Telegraph Superintendent, M.R.; Mr. F. Wentworth-Sheilds, Docks Engineer, L. & S.W R.; Major J. H. Smeddle, T.D., Running Superintendent, N.E.R.; Mr. G. E. Smyth, Traffic Manager, G.S. & W.R.; Mr. R. Absalom Thom, Assistant to Chief Mechanical Engineer, G.C.R.; Mr. J. Walker, Assistant General Manager, N.B.R.; Mr. W. W. H. Warneford, Wagon Superintendent, L. & N.W.R.; Mr. S. Warner, Carriage and Wagon Superintendent, L. & S.W.R.; Mr. F. W. West, London District Goods Superintendent, S.E. & C.R.; Mr. A. White, Assistant to Superintendent of the Line, L.B. & S.C.R.; Mr. F. Wintour, Assistant Locomotive Engineer and Works Manager, G.N.R.

FOOTPLATE AND CAB FITTINGS OF NEW 4-4-0 EXPRESS LOCOMOTIVE. GREAT CENTRAL RAILWAY.



(*See Frontispiece, and description on page* 342.)

Digitized by Google

RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, 30, *Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like, readers should consult the pages of the "Railway Year Book," for the current year. Price 5s. By post 5s. 6d. Abroad 5s. 8d.*

Swansea Connections, G.W.R.

Your suggestion that Swansea could be served from the new route completed by the Swansea avoiding lines has been submitted to officials of the Great Western Railway, and it is pointed out that although it is practicable to serve Swansea *via* Felin Fran and Morriston, the distance is about 1½ miles further than *via* the main line, while a portion of the Felin Fran–Morriston line is single. The line from Cardiff to Swansea *via* Neath Bridge and Briton Ferry Road terminates at East Dock, and trains by this route could not be run to Swansea (High Street) without being reversed twice.

[Reply to R. P. ANGUS LEWIS.]

Pre-War South Wales Train Services.

The 9.15 a.m. from Pembroke Dock ran *via* Landore and called at Pembroke, Manorbier, Penally, Tenby (dep. 10 a.m.), Saundersfoot, Whitland (dep. 10.41 a.m.), St. Clears, Carmarthen Junction (dep. 11.18 a.m.), Llanelly (dep. 11.48 a.m.), Cardiff (dep. 1.27 p.m.), Newport (dep. 1.50 p.m.), Paddington (arr. 4.30 p.m.). The 2.28 p.m. from Cardiff also travelled *via* Landore and called at Carmarthen Junction (dep. 4.20 p.m.), Saundersfoot, Tenby (dep. 5.25 p.m.), Penally, Manorbier and Pembroke, reaching Pembroke Dock at 5.55 p.m.

[Reply to E. PERMAN.]

Four-Track Sections, Midland Railway.

We have not the space available to detail all the four-track sections of the Midland Railway, but may say that the principal are between St. Pancras and Glendon Junction, 75 miles; Wigston Junction and Tapton Junction (Chesterfield), 51 miles; and Rotherham and Shipley Junction (with short breaks), 45 miles. As a general rule the two fast tracks on the Midland Railway are placed together, and the two slow tracks, with certain exceptions reserved exclusively for goods traffic, are also arranged together, on the up side of the passenger tracks.

[Reply to "MIDLAND ENTHUSIAST."]

South Eastern & Chatham Railway Engines.

No. 13 (domeless) Stirling 4-4-0 locomotive has the original type of boiler. This engine has not been rebuilt. The boiler may appear larger than the others, but it is the same size. The shorter chimney with "capuchon" probably accounts for the optical illusion. It is one of the remaining four of the "440" class not yet rebuilt. The others are 34, 441 and 458, class "B" (South Eastern Railway 4-4-0). No. 34 is fitted with Maunsell's top-feed arrangement, and works the Appledore and New Romney branch.

[Reply to E. HEARD.]

G.W.R. Locomotive "Earl Cawdor."

Your further comment is noted that this engine was fitted with a "City" class boiler some time before the outbreak of war, and that for a period it regularly worked the 6.30 p.m. down express from Paddington, returning from Bristol (East

Digitized by Google

Depôt) with the 10.30 p.m. express goods train for Acton, a duty subsequently handed over to No. 111, *The Great Bear*. It is also noted that the engine was later stationed at Bristol.

[Reply to J. BRANDER.]

Water Troughs, Midland Railway.

Water troughs are situated between Oakley and Sharnbrook, Loughborough and Hathern, and Dent and Hawes Junction, on the main line from London to Carlisle; also near Melton Mowbray, on the Kettering-Nottingham section, and between Haselour and Tamworth, on the Derby-Birmingham section. You can obtain all information of this character from the RAILWAY YEAR BOOK. Your other question transgresses the rules.

[Reply to "DERBY."]

Belfast & County Down Railway Locomotives.

Locomotives on this line are painted dark green, lined in white. There are four tender engines of 2-4-0 type, and four of the ordinary 0-6-0 class, together with the following tank engines:—four (0-4-2), six (2-4-2), and 12 (4-4-2). For information of this character see the RAILWAY YEAR BOOK, the 1920 edition of which is now published.

[Reply to H. F.]

North British Railway "Atlantic" Engines.

None of the North British Railway "Atlantics" was ever named "Lady Constance"; this was probably an original title on the part of the makers of your model. All the 20 engines of this type belong uniformly to the original "Aberdonian" class, the only variation from type being that some of them have been superheated subsequently.

[Reply to "SMOKEBOX."]

Great Northern Railway 2-6-0 Locomotive No. 1000.

It is manifestly impossible to specify regular working of a new engine, especially when it is as much intended for goods as for passenger service. Frequently new locomotives are tested on various duties, and even when placed in a definite link a number of "turns" are usually "worked round" by each engine concerned.

[Reply to R. E. ABBOTT.]

London and South Western Railway Sleeping Cars.

These were intended for use on special Transatlantic boat express trains between Plymouth and London, and were uniform in external appearance with the ordinary main line stock. But we are not sure whether they are still extant in their original form, or have been converted into vehicles of other types.

[Reply to R. S. JOHN.]

Telegraph Poles.

There is no absolutely invariable distance at which telegraph poles are placed from one another, and if you require this information in connection with estimating the speed of trains, we would warn you that this is a very inaccurate method. You should work in all cases off the ¼-mile posts, on the down side of the line between Liverpool Street and Ely.

[Reply to J. H. L. L.]

Motor Coaches, Metropolitan Railway.

Whether made up to six or seven cars the motor equipment is standard, and the number of motor coaches included in the train governs the extent to which power can be utilised. In working trains current is taken, up to the capacities of the motors, and providing there is sufficient adhesion-weight, according to the load demands.

[Reply to F. T. CLIVE.]

2-4-2 Engines, L. & N.W.R.

The "Greater Britain" class were Webb three-cylinder compounds with uncoupled driving wheels, so that the wheel type was correctly 2-2-2-2 or 2-2,2-2. There was also the corresponding "John Hick" class, with smaller driving wheels. All have been broken up for several years past.

[Reply to "L.N.W.R."]

N.L.R. "War" Coaches at Bushey.

The trains seen in sidings near Bushey, London & North Western Railway, are old North London stock returned from France after "serving with the colours." They were painted grey and lettered by the military authorities. The word "Sukker" which appears upon them probably had a local signification.

[Reply to A. H. CROXTON.]

Steam Train Working, Metropolitan Railway.

Vacuum brakes are fitted to rolling-stock employed on steam services to

Digitized by Google

and from Chesham, Aylesbury, &c., and the electric locomotives which work these trains south of Harrow are therefore equipped with vacuum as well as Westinghouse brake apparatus.

[Reply to F. T. CLIVE.]

4-6-0 Locomotives, London and South Western Railway.

There are now 46 engines of the 4-6-0 type on this railway; 20 of these are of Mr. Urie's design, so that the remainder will be Drummond engines, some rebuilt. For information of this class see the RAILWAY YEAR BOOK, the 1920 edition of which is now published.

[Reply to J. A. O'FARRELL.]

Grantham Accident. Great Northern Railway.

This occurred through the 8.45 p.m. (now 8.25) express from King's Cross to Edinburgh failing to stop at Grantham, and being derailed on the curve leading to the Nottingham branch, on September 19, 1906. The engine was 4-4-2 No. 276, subsequently repaired and still running.

[Reply to "FRONT END."]

Water-troughs.

There are no water-troughs on the London and South Western Railway, though one of Mr. Drummond's 4-6-0 engines was fitted some years ago with water pick-up equipment, presumably in view of working through to other railways.

[Reply to J. A. O'FARRELL.]

The "Decapod," Great Eastern Railway.

When converted to a 0-8-0 engine, a new boiler and various essential changes were required; but a fair amount of the original 0-10-0 tank design was utilised, so that it would be correct to describe it as "rebuild," albeit a drastic one. It was broken up some years ago.

[Reply to B. ALFRED BRIGGS.]

The "Most Powerful" Express Engine.

So many factors must be taken into account in arriving at a decision on this knotty point that we must leave you to form your own conclusions in the matter from a study of the dimensions of the various engines concerned.

[Reply to R. S. JOHN.]

Railway Stations at Exeter.

A sketch plan showing the railway stations and the London & South Western Railway goods yards at Exeter, was reproduced in the RAILWAY MAGAZINE, October, 1907, and the general features have been many times referred to.

[Reply to B. ALFRED BRIGGS.]

Exceptional Midland Locomotives.

We have on several occasions stated that no information has ever been issued in regard to the exceptional 2-6-2 engine No. 2299; 0-10-0 engine No. 2290 was described last month and illustrated as frontispiece.

[Reply to R. GOODCHILD.]

2-4-0 Tank Engines, London and North Western Railway.

These have been converted from the familiar 2-4-2 types, principally for service on motor-trains, on which so large a bunker capacity as enjoyed by the 2-4-2 engines is not required.

[Reply to "L.N.W.R."]

Great Western Railway Locomotive Classes.

We cannot spare the space necessary for detailing all the locomotive classes on this railway, and are unable to refer you to any publication in which you can obtain this information.

[Reply to W. L. K.]

"736" Class 4-6-0 Engines, London and South Western Railway.

These engines weigh 77 tons 17 cwt., and their tenders 57 tons 1 cwt., total 134 tons 18 cwt. in working order, and their nominal tractive effort at 80 per cent. working pressure is 24,700 lbs.

[Reply to L.H.F.]

The "Cornish Riviera" Express, Great Western Railway.

This train has never slipped coaches at any stations other than Westbury, Taunton and Exeter; at the present time it slips at the two last-mentioned places only.

[Reply to "SUTTONIAN."]

Mellis and Eye Branch, Great Eastern Railway.

This branch has a length of two miles, 71 chains, and forms a part of the Great Eastern system. Through carriages are not worked between Liverpool Street and Eye.

[Reply to "SUTTONIAN.]

Steel Dining Coaches.

No British railway other than the North British Railway has at present any all-steel dining cars in service. Your other query transgresses the rules; see the RAILWAY YEAR BOOK.

[Reply to "WAVERLEY."]

Digitized by Google

Locomotive Classification, L. & N.W.R.

The letter "A" painted on the side panels of London & North Western Railway 0-8-0 locomotives, indicates that engines so marked are reserved to work certain classes of traffic.

[Reply to C. B. FIRTH.]

Blackfriars Station.

Opened in 1864, Blackfriars Station remained in use for passenger traffic until shortly before St. Paul's Station was completed in 1886, since when it has been employed for goods traffic only.

[Reply to T. A. LITTLE.]

Wallingford and Abingdon Branches, Great Western Railway.

We know of no regular through services having been worked at any time between Paddington and Wallingford or Abingdon.

[Reply to "SUTTONIAN."]

Unnamed Locomotives, London and North Western Railway.

We have no information as to whether the recent express engines built by this company are to receive names at a future date.

[Reply to G. R. DEWEY.]

Urie 4-6-0 No. 743, London and South Western Railway.

Full-page plate of this engine on page 166 of the March issue was reproduced from a photograph by R. Barrett, 37, Parr Street, Exeter.

[Reply to H. INNES.]

Cuffley-Hertford Line: G.N.R.

This line has been used for goods traffic for some time, but as only single track has been laid it may be some time before it is brought into use for general traffic.

[Reply to T. A. LITTLE.]

The Race to Aberdeen, 1895.

On the night of the fastest West Coast run the load behind the tender was 70 tons, whereas the East Coast load on the fastest night was 105 tons.

[Reply to "E. C. J. S."]

The "Best" Goods Service.

Until you make your question more explicit, we fear we are unable to answer it; a very large number of factors must be taken into consideration.

[Reply to "FIRE-BOX."]

Midland Railway Locomotives.

Absence of large locomotives on this system is principally due, we believe, to considerations of maximum weight on underline bridgework.

[Reply to A. G. BROWN.]

G.C.R. Locomotive "Lord Faringdon."

Full dimensions of this engine were given in the RAILWAY MAGAZINE, February, 1918, copies of which can still be had, price 1s., post free.

[Reply to "CHESHAM."]

"842" Class Engines, London and South Western Railway.

The 482-491 4-6-0 series of Mr. Urie's design are heavier, but less powerful than the 736 class.

[Reply to "RECORD."]

Pullman Cars, London and South Western Railway.

No Pullman Cars are now in service on the London and South Western Railway.

[Reply to J. A. O'FARRELL.]

0-10-0 Engine No. 2290, Midland Railway.

You are quite correct; particulars of the new engine were not available at the time we drafted our reply.

[Further reply to H. E. WOOD.]

S.E. & C.R. Locomotives.

No 4-6-0 engines are employed on this railway, and there is only one of the 2-6-0 type.

[Reply to A. H. VALLANCE.]

1 p.m. Express Euston-Glasgow, West Coast.

This train is not booked to stop at Preston for any purpose.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Ipswich Station, Great Eastern Railway.

Length of the up main platform is 367 yards.

[Reply to "G.E.R."]

Great Western Railway "Record of Records."

For a short distance on Wellington bank 102.3 miles per hour was attained.

[Reply to "RECORD."]

Gradients, Kingswear-Churston, Great Western Railway.

The ruling, or steepest, gradient of this incline is 1 in 66.

[Reply to L.H.F.]

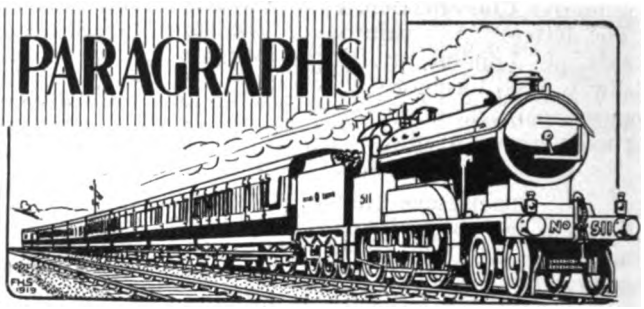
Public Time-books.

The various companies have now resumed the issue of public time-tables.

[Reply to "PADSTOWNIAN."]

Digitized by Google

PERTINENT PARAGRAPHS



New 4-4-0 Express Locomotives, Great Central Railway.

In view of the special interest attaching to the well-known "Director" class of 4-4-0 engines which have rendered such good service on the London—Manchester express trains of the Great Central Railway, the appearance of a further series of engines of the same general class, but including certain improvements and changes, will be welcomed by readers of The Railway Magazine. By courtesy of Mr. J. G. Robinson, Chief Mechanical Engineer, the first of the new class is illustrated as frontispiece, while on page 337 a view is reproduced showing the cab interior, from which the convenient placing of the various controls and fittings will be noted.

These engines are substantially the same as the "Director" class, the first of which was turned out on August 16, 1913. Diameter of the driving-wheels is 6 ft. 9 in.; cylinders are 20-in. diameter and have a stroke of 26-in.; distribution of steam is accomplished by means of 10-in. diam. piston valves arranged for inside steam admission. These valves are placed over the cylinders and are driven by Stephenson link motion through rocking shafts. The piston valves are of the "Robinson" type, and are fitted with pressure release rings. The boiler has a maximum diameter of 5 ft. 3 in., and the barrel is 12 ft. 3 in. long; the firebox is of the "Belpaire" type and is 8 ft. 6 in. long outside. The engine is fitted with a "Robinson" type superheater having 24 short return loop elements, the ends of the element being expanded directly into the header; circulating and header discharge valves are fitted. Safety valves of "Ross" type are employed. Cylinders, steam-chests and also the driving axle-boxes are lubricated by means of the "Intensifore" lubricator.

An enclosed cab, with extended roof, is fitted, a new development on the Great Central Railway, and this is very commodious and well fitted up. The windows at the sides are of the sliding pattern.

The main frames are parallel from end to end, no reduction being made in the distance between them forward of the motion plate. Both pairs of bogie wheels have, therefore, to run beneath the frame plates on sharp curves, and, in consequence, the main frame plates must be suitably shaped to allow for this. The bogie has a total side play of 5½ in., controlled by double-laminated springs. This large amount of side play enables the engine readily to pass through curves of 5 chains radius.

The engine and tender are fitted with a steam brake controlled by means of a vacuum brake, the vacuum fittings consisting of a 25/20 mm. "Dreadnought" ejector.

Other dimensions are :—

Working pressure	180 lb. per sq. in.
Heating surface—	
Firebox, outside	155 sq. ft.
Large tubes	416 sq. ft.
Small tubes	972 sq. ft.
Superheater, inside ...	209 sq. ft.
Total	1,752 sq. ft.
Grate area	26 sq. ft.

The engine develops a tractive force at 85 per cent. of the boiler pressure of 19,385 lb. Adhesion weight is 39 tons 16 cwt. on a coupled wheelbase of 10 ft. In working order the engine weighs 61 tons 3 cwt. without tender. The latter is of the standard Great Central six-wheeled type, having a capacity for 4,000 gallons of water and 6 tons of coal. The standard Great Central water pick-up apparatus is fitted.

The engines present a handsome appearance and it may fully be anticipated that the new ones will prove as satisfactory in service as those previously built. The first two are numbered and named: 506, *Butler-Henderson*, and 507, *Gerald Powys Dewhurst*.

"Regulated Monopoly."

Advisedly the inaugural address given by Sir Eric Geddes, Minister of Transport, as "First President" of the newly-formed Institute of Transport, dealt with the main features of the railway situation. Incident-

Digitized by Google

ally, he challenged assertions as to "transport chaos" by the statement that the present totals of traffic dealt with considerably exceed those of the previous highest years, and that the alleged "chaos" does not exist. Obviously, any who came expecting to be informed as to the future policy of the Government in regard to railways were bound to be disappointed; but a strong indication was given that the tendency may be towards what was described as "regulated monopoly." In other words, transport undertakings should be directly controlled by the State, which, in return for the statutory protection and statutory privileges granted, would have the right, on behalf of the community, to impel changes in organisation, in administration and in operation, where such were considered necessary in the national interest.

Sir Eric pointed out that in no single case abroad had nationalisation of railways been effected for theoretical reasons: it had always been a question of practical policy to meet the actual necessities of the moment. In Belgium and Switzerland State railways were adopted lest foreign capital should obtain control. In Italy, to cut the entanglement of badly-drawn leases. In Japan, to terminate concessions to companies which prevented reductions of rates believed to be required in the public interest. In Australasia, and in the early days in East Prussia, because railways were necessary, and private capital would not build them. In Germany, after 1870, in Russia, and in North-West India, primarily for military reasons. In Canada, the Canadian Northern and the Grand Trunk systems have just been nationalised because the companies had ceased to be able to carry the burdens which they had been encouraged by the Government to assume.

The Transport Situation To-day.

THIS outline of the railway conditions in other lands led to a consideration of the present position of the transport agencies in this country, and Sir Eric referred to the curious fact that this country, the first to develop modern transport, was the last to recognise the intimacy of the relation between the transport agencies and the public welfare. He urged that, now it was generally recognised that the healthy existence and development of the transport agencies were vital to the State, the relationship between the community, through its elected representatives, and the statutory transport undertakings should be a very close one, and postulated his belief in a system of "regulated monopoly."

Such a policy does not, however, necessarily mean the establishment of a vast bureaucracy. It means, rather, the application of scientific methods—the most modern industrial methods, in short—to the work of transport. Modern industrialism tends to become more and more comprehensive. Amalgamations and arrangements designed to control the entire production of a commodity are constantly being effected. And a "regulated monopoly" of transport, properly conducted, would follow very much on the same lines. With a competent staff, expert in their respective spheres, and hearty co-operation with the existing transport managements, it should be possible to obtain the best results of co-ordinated working at a comparatively small cost, and without any necessity for a "vast bureaucracy."

Competition in transport facilities is waste: "Creation and not piracy," to use Sir Eric Geddes' apt phrase, should be the basis of all transportation in the future, and suitable "regulated monopoly" would suffice to divide the traffic in accordance with national requirements in such a manner that each class of traffic was handled by the transport undertaking most fitted for the task.

Emphasis was laid upon the value of "full, accurate and live" statistics of operation, not only for working purposes, but for public information. The recent standardisation of railway operating statistics is an effort towards this end, and we heartily endorse the strong plea of the Minister of Transport for the widest possible publicity to be given to such figures. Only in such a way will "suspicion, which is always bred of ignorance, be dispelled."

How Railway Rates affect the Cost of Living.

IN order to show "the man in the street" how the new railway rates affect the cost of living, or rather how small in reality is the effect thereon, the Railway Clearing House has issued a pamphlet which is well worthy of careful study. The first section is devoted to examples of rates for merchandise conveyed by goods trains; the second to passenger train rates. The rates are worked out to the price per pound or other unit, thus adopting the principle employed in certain of our own references to the subject. The average citizen is not concerned with the fact that fresh meat is carried from Liverpool to London at 45s. 7d. per ton. He has no inclination to find out how much it is per pound weight, but the pamphlet gives this information, and it shows the consumer that the cost of railway carriage is trifling. This is illustrated by the pictorial representation printed on the back page of the cover and reproduced overleaf. Few people realise that fish is conveyed from Aberdeen to

Digitized by Google

REPRODUCTION OF BACK COVER OF RAILWAY RATES PAMPHLET ISSUED BY THE RAILWAY CLEARING HOUSE.

London, a distance of 525 miles, by express train, for a total rail charge of just over ½d. per pound, or that the charge for conveyance of fish, such as brill, cod, ling, haddock, plaice and skate by passenger train from Grimsby and Hull to London is only ¼d. per pound.

It has been suggested that the quotation of specimen railway rates affords no useful purpose, as they do not cover the carriage of goods in the raw state. To meet this objection the rates have been calculated for the carriage of cotton from its raw state through all the various processes of manufacture until the cloth is ready for export. The total increased cost of carriage is ·237d. per lb., or less than ¼d. per lb. Other examples quoted are for the conveyance of tobacco leaf from Birkenhead to Bristol, where the increase is ·09d. per lb., and manufactured tobacco from Bristol to London, showing that the increase is ·11d. per lb. In the case of jam the increase in the rate for plums from Faversham (Kent) to Liverpool is given as ·11d. per lb. Increase in the conveyance charge for plum jam is shown as ·145d. per lb., Liverpool to Southampton being the selected points. If the weight of the jar or carton, which has not been taken into consideration, was as much as the jam, the additional charge would only be about 1d. per 3½ lb. What is true of cotton, cloth, tobacco or jam, applies to other articles of merchandise or food, whether they are hardware, furniture, or eggs, &c. In many instances allowances have been made for the weight of packing..

An analysis of the cost of railway carriage in relation to the value of goods gives interesting results, The carriage of an actual consignment of boots and shoes from Rushden (Northamptonshire) to London, valued at £19 4s., and weighing 30 lb. is 1s. 9d. Another example indicates that 42 lb. of tobacco and cigarettes, valued at £20 18s. 4d., were carried by passenger train from London to Bedford at the owner's risk rate of ·36d. per lb., a total for the consignment of 1s. 3d. With the increase of 50 per cent., the total charge of 1s. 11d. works out to ·55d. per lb., the increase being ·19d. per lb., or 1d. on 5 lb. Many other examples could be quoted to show that the amount involved in railway charges, as compared with value of goods carried, is very small.

Turning to conveyance by passenger train under owner's risk conditions, the increase on fish represents 1d. on 5 or 6 lb., on an average; on eggs, 1d. on 60; on margarine, 1d. on 6 lb.; on poultry, 1d. on 10 lb.; on fruit, 1d on 10 lb.; on vegetables, 1d. on 16 or 20 lb., and so forth. There is no increase in charges for the carriage of fresh milk, which the railway companies are still carrying at very low rates. There is also no increase in goods train rates for conveyance of manure in bulk, packed manure, basic slag, or lime for agricultural purposes.

Railway Estimates, 1920-21.

It will be some time before our railways can once again operate their businesses on commercial lines, for there are still large arrears of maintenance and new construction to be overtaken, the cost of which, apart from the companies' own reserves, has to be

Digitized by Google

borne by the State. But the estimate recently issued by the Ministry of Transport is distinctly favourable in that it affords indications that the present abnormal condition is within measurable distance of termination by the return of economically-sound railway operation. Thus, instead of a Railway Agreements Vote of £60,000,000 as a year ago, a net sum of only £23,000,000 is now asked for, and of this no less than £22,000,000 is for arrears of maintenance and renewal works which have occurred during the war, and for interest on capital expenditure, while the remaining £1,000,000 is for purchase of rolling-stock from the Ministry of Munitions for the Government Pool. For the Ministry of Transport itself the estimate of cost is £1,433,642, but of this £1,000,000 is allocated for grants to transportation schemes, as provided for by the Transport Act, £54,500 for the Government pool of motor passenger cars, and £25,000 for advances to the Electricity Commissioners, leaving £416,592 for salaries, wages and allowances, and £28,650 for miscellaneous charges.

It is pointed out that the work of the Ministry involves the examination of a gross annual expenditure at the rate of, approximately, £200,000,000 per annum. It is hoped, in view of the revised rates now operative, that apart from the deferred liabilities under the agreement, the railways will be able to meet their operating expenses and earn net receipts on the basis of 1913, thus ceasing to be a direct charge upon the nation.

Important progress is being made with the revision of rates and reclassification on a more scientific basis, while special attention is being given to the compilation of statistics designed to give correct views of railway operating conditions and problems. Various other aspects of the present railway situation and proposals for the future are dealt with in conjunction with these estimates as a "statement as to railways."

Railway Traffic for 1919.

SOME important statistics concerning railways and traffic during 1919 are also given in this statement. It is pointed out that with *a decreased number of locomotives and wagons in traffic and a shorter working day*, the railways are actually coping with a larger volume of work than in 1913. In view of allegations as to inefficient working which are widely current, this statement throws a new light upon the railway situation. Indeed, it is probably the delays and uncertainties inevitable to an abnormal situation which are largely responsible for this view on the part of the public, otherwise there would be greater appreciation of what the railways have done and are doing and fewer criticisms as to their failures to satisfy conditions which are very different from those of pre-war days, with less plant and equipment than they then had available

During 1919, on sixteen principal railways, and exclusive of season-ticket holders, the number of passengers conveyed was 974,259,966, an increase of 156,278,127 (19·1 per cent.) over 1913. On an annual basis, the number of season tickets issued was 735,172, an increase of 245,697 (50·2 per cent.), causing from 100 to 150 million additional journeys, and increasing the total annual carriage of passengers by nearly 300,000,000 more than in 1913. Freight traffic on controlled railways during 1919 was nearly £5,000,000 (7 per cent.) more than in 1913, on the basis of the same charges, and excluding Government traffic amounting to £21,000,000, of which about half was freight traffic.

On the same sixteen principal railways there were, at the end of June, 1919, 17,743 locomotives in service (1,186 less than in 1913 reduced to 293 less by the end of December, 1919); and 650,606 wagons (45,315 less, reduced in December to 19,391). During the year, 32,848 new wagons were ordered, 21,306 in railway shops, and 11,542 from outside firms, and these were put into traffic during the three months ending November 30, 1919, at the rate of 888 per month, the average now being 1,668 per month, or nearly double. The great difficulty is, however, the delays caused by the alteration in working hours, both on the railways and in other trades. Thus, during December, no fewer than 365,533 wagon-days were lost, over and above the "free time" for loading and unloading traffic.

In connection with these and other statistics, readers may be referred to the 1920 edition of the RAILWAY YEAR BOOK, in which much other valuable statistical information concerning railway working during 1919 is available.

Railway Operating Statistics

A STANDARD system to govern the compilation of railway operating statistics has been instituted by the Minister of Transport. When it is borne in mind that even in countries where ton-mile, wagon-mile and other recognised statistics are regularly compiled important differences in interpretation frequently render comparisons unreliable, it will be recognised that standard interpretations as well as standard methods are necessary, and this the new general instructions should secure. For instance, it was found in the United States that some railways included every car owned, others only those in service, in calculating "average miles per

Digitized by Google

car-day." These and other possible differences have been avoided in the United States since a standardised system was laid down by the Railroad Administration in August, 1918, and in this country the instructions which have been issued should realise from the start the uniformity which is essential. For their own purposes, several of the home railways were already compiling statistics of the desired character; but from January 1st of this year, every line is required to prepare the same records, based upon specified interpretations, in regard to train-miles, train-hours, engine-miles, engine-hours, ton-miles, wagon-miles, tons and receipts of principal traffics, and commodity ton-miles. Other records, and amplifications of these, may be added, but for practical purposes these should suffice to give substantially accurate indications as to the economic aspects of traffic handled, and to the relations between revenue earned and duties performed in realising it.

Opinions differ, and will continue to differ, in regard to the much-discussed ton-mile basis of operating statistics. Admitted that a large proportion of traffic is governed more by bulk than by weight, while underloading is inevitable to a considerable degree under the geographical and industrial conditions which obtain here. But with a distinction between mineral traffic, which realises a nearer equality between rated and actual load on a weight basis, though it also involves a larger proportion of return empty running, and general merchandise, with live stock in a separate class, the final result should give a reasonably accurate presentment of the facts. In any case, while gross train-mile (including tare of wagons) and rated ton-mile (based upon possible full-loads) statistics are valuable for comparison, and there must always be a fair percentage of non-revenue-earning traffic (as for the company's own purposes), the net ton-mile appears to offer the best unit in conjunction with classified traffic and engine miles.

In addition to net ton-miles for all traffic divided into (1) merchandise, (2) coal, coke and patent fuel, and (3) other minerals, full information will become available as to the movements of 72 groups of commodities covering upwards of 2,000 items in the classification. The information as to specific traffics has never before been available for the country as a whole. There will now be compiled for every company the tonnage and receipts for the whole year and ton-miles for a selection of the traffics will be computed each period of four weeks.

How the Statistics are Being Prepared.

Specified forms in which the desired data is to be set forth have been issued, and the following brief review will be of interest:—

Train and engine mileage.—In the first place there are two main divisions:—(1) Mileage of company's engines; (2) Mileage over company's system either by own engines or engines of other companies. Each division is sub-divided into coaching and freight. Coaching-miles are split up under the following headings:—(*a*) Train; (*b*) Shunting; (*c*) Assisting required; (*d*) Assisting not required; and (*e*) Light. Freight miles are similarly divided with an additional heading —"Departmental Miles"—the miles incurred by each department being separately given. In all cases miles worked by electric engines or motor vehicles are distinguished, as also Sunday working.

Train and engine-hours.—The divisions applied in compiling train and engine-mileage are strictly followed, so that sound units of comparison can be secured. Engine-hours throughout are divided between: (*a*) In traffic, and (*b*) locomotive duties.

Net ton-miles.—There are four returns for these statistics:—(1) Merchandise; (2) Coal, coke and patent fuel; (3) Other minerals; (4) All descriptions of freight traffic. These will be rendered by each company to the Ministry of Transport where figures for the whole country will be compiled. Each return, which will be rendered in four weekly periods, will show:—(*a*) Local forwarded; (*b*) Foreign forwarded; (*c*) Foreign received; and (*d*) Transit or through-through. Live-stock is included on a ton-mile basis, conversion factors being specified.

Commodity statistics.—The list of traffic headings for which tonnage and receipts will be compiled throughout the year and ton-miles for a period of four weeks each year is a very comprehensive one. The headings comprise 45 S. to S. traffic groups and 27 C. and D., and probably cover some 70 to 80 per cent. of merchandise traffic.

Wagon miles.—Forms issued up to the present provide for a return of wagon-miles, loaded and empty, being separately given. These returns are compiled from the freight guards' train reports.

The statistics outlined may appear to some to be elaborate, but they have been in operation for years in practically every other country, and have been recently extended and improved in the United States. The information thus rendered available will stimulate interest in British railways and re-act to the advantage of the companies. In conclusion, it may be of interest to set out a few of the more important units of efficiency which can be deduced from these returns, none of which has been available until now:—(*a*) Average train-load; (*b*) Average length of haul; (*c*) Average wagon-load; (*d*) Wagon-miles per train-hour; (*e*) Ton-

Digitized by Google

miles per engine-hour; (*f*) Shunting miles per 100 train-miles; (*g*) Percentage of empty wagon mileage to laden; (*h*) Percentage of engine time in traffic to total engine-hours; and (*i*) Receipts per ton-mile.

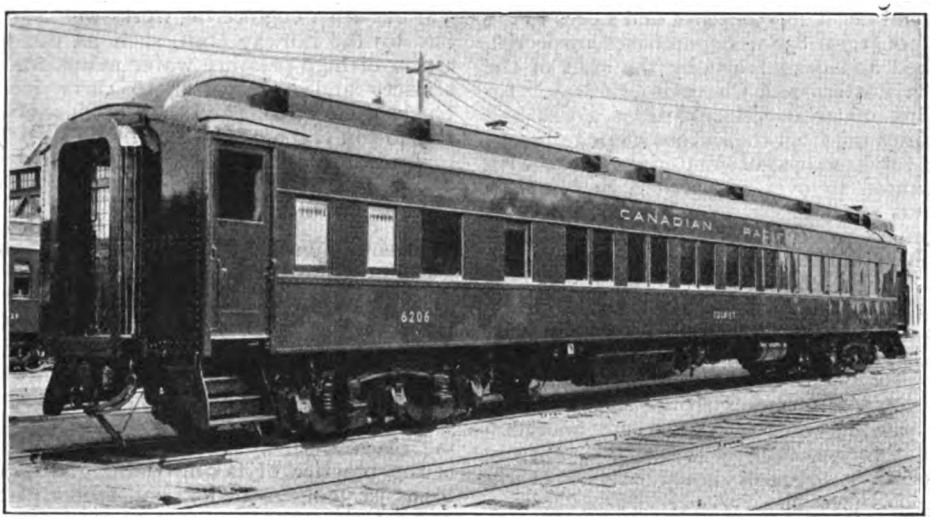
New Tourist Cars, Canadian Pacific Railway.

For general "tourist" traffic which calls for good and sufficient travel accommodation at minimum cost, cars of this type are mostly used in Canada, and while less ornate and elaborately fitted up than the standard sleeping, parlour and other cars in use, they realise a high level of excellence, as will be seen from the view reproduced below showing a new class of "steel" tourist car, of which 30 have so far been placed in service by the CanadianPacific Railway on Trans-Continental trains.

The interior is neatly and attractively finished in plain mahogany, with seats upholstered in leather. Wash-stands and plumbing represent the latest and best improvements, both as to convenience and cleanliness. Throughout the car all pipes are clear of the floor, so as to facilitate thorough cleaning at all times, and the cars are equipped with the standard sleeping car water-raising system arranged to supply both hot and cold water to all wash-bowls, while standard dental bowls are installed in smoking room and women's dressing room.

The kitchens are finished in white enamel, with white tile from top of work table to under side of lockers. The work table is polished in Monel metal and the sink in white enamel. A refrigerator is provided with sufficient capacity to take care of milk, butter, meats, and other perishables; this refrigerator is lined with polished Monel metal, and the ice bulkhead and shelves can be lifted out easily so as to permit of thorough cleaning. Its bottom shelf is provided with a metal tray, specially designed to hold milk bottles, and so constructed that there are no solid corners, and the openings permit of air circulation even when the tray is filled with bottles.

In addition to the usual tourist car coal range, these cars are equipped with two-burner gas stoves, located on top of the coal ranges, but so arranged that they can be lifted up out of the way when a coal fire is being used.



NEW TOURIST CAR FOR TRANS-CONTINENTAL SERVICES, CANADIAN PACIFIC RAILWAY.

Length over body is 73 ft. 6 in., over couplers, 81 ft. 10 in.

Special War Services by the South Eastern and Chatham Railway.

In the course of an address, given by Mr. E. C. Cox, Superintendent of the Line, on behalf of Sir Francis Dent, General Manager, to the members of the Epsom and District Literary and Scientific Society, reference was made to some little-known and special services rendered by the South Eastern and Chatham Railway during the war. Thus, it was necessary at a relatively early date, to send large supplies of railway and miscellaneous material, owing to the fact that while extensive railway development was essential, neither the French nor the Belgian railways were able to meet the

Digitized by Google

demand. Consequently, as a commencement, 71,099 tons of rails and fish plates, 11,997 tons of bolts and coach screws, 6,749 tons of bridge work, girders, plates and angles, 2,620 tons of cast-iron chains, 1,616 tons of signalling apparatus, 240,000 signalling pulleys, 70 miles of pipes, weighing 10,307 tons, and 120 steam engines, weighing 522 tons, were supplied through the agency of the South Eastern and Chatham Railway. Eventually, the Advisory Sub-Committee of Stores to the War Office, under the presidency of Mr. R. E. C. Maunsell, Chief Mechanical Engineer, South Eastern and Chatham Railway, was established to deal with contracts and supplies of a railway and associated character required by the armies overseas, including those in Egypt, Mesopotamia, Salonika and Russia, as well as France. Total contracts thus placed numbered some 11,500, and embraced 28,350 items, and stores to the value of £1,791,838 were purchased, inspected, packed and despatched by the staff of the South Eastern and Chatham Railway. Including material collected from works and factories and from the various home railways, the total value of material dealt with amounted to over two and a half million pounds sterling.

Among work of a special character thus involved may be mentioned that many of the Belgian engines saved from the enemy were short of important parts, and as drawings and patterns were usually unavailable, rough sketches of the parts required were made by Belgian and English draughtsmen in France, and completed drawings made in the drawing office at Ashford for manufacture at various railway works here. Missing parts thus supplied amounted to nearly £80,000 in value.

Railway Construction at Boulogne.

SPECIAL interest attaches to the engineering work carried out at Boulogne under the direction, as Consulting Engineer to the French and Belgian railways, of Mr. P. C. Tempest, then Chief Engineer, and now General Manager and Chief Engineer, South Eastern and Chatham Railway Existing sidings, etc., were quite inadequate for the tremendous flow of traffic into France, and, therefore, on the waste ground adjacent to the south-west corner of the Bassin Loubet, between the cliffs and the sea, arrangements were made to provide many sets of sidings for marshalling purposes and storage areas. It was necessary to intersect the various buildings with roadways, increase the siding accommodation on the quays, and construct a Royal Engineers' park with sidings, loading platforms, stores and workshops. To make these sites possible for the laying of the sidings and roads, an extensive drainage system was required, in the carrying out of which 2¾ miles of drain pipes and 143 manholes or gullies with grids were used, and as the ground upon which the group of sidings was to be laid was, on an average, 4 to 5 ft. higher than the required level, and consisted of waterlogged clay, sand, etc., it had to be removed.

In this levelling, 34,000 cubic yards of spoil had to be dealt with and conveyed by a light railway to a piece of waste ground over ¾ mile distant along the coast west of the sea wall, and this dumping ground, in turn, became, at a later date, the site of a third group of sidings and an ammunition dump. The length of the new sidings laid on these various sites amounted to 10 miles 2 chains, and in these were incorporated 93 sets of points and 130 crossings. In order to retain the boggy soil, a sea wall 700 ft. long had to be constructed. Various other engineering works were carried out by the railway staff, such as the provision of high-pressure water mains for fire services and a traverser to carry loaded trucks up to 20 tons and the electrification of the 40-ton crane at the Bassin à Flot. The maintenance of the whole of these works was carried out under the supervision of the company until September, 1916.

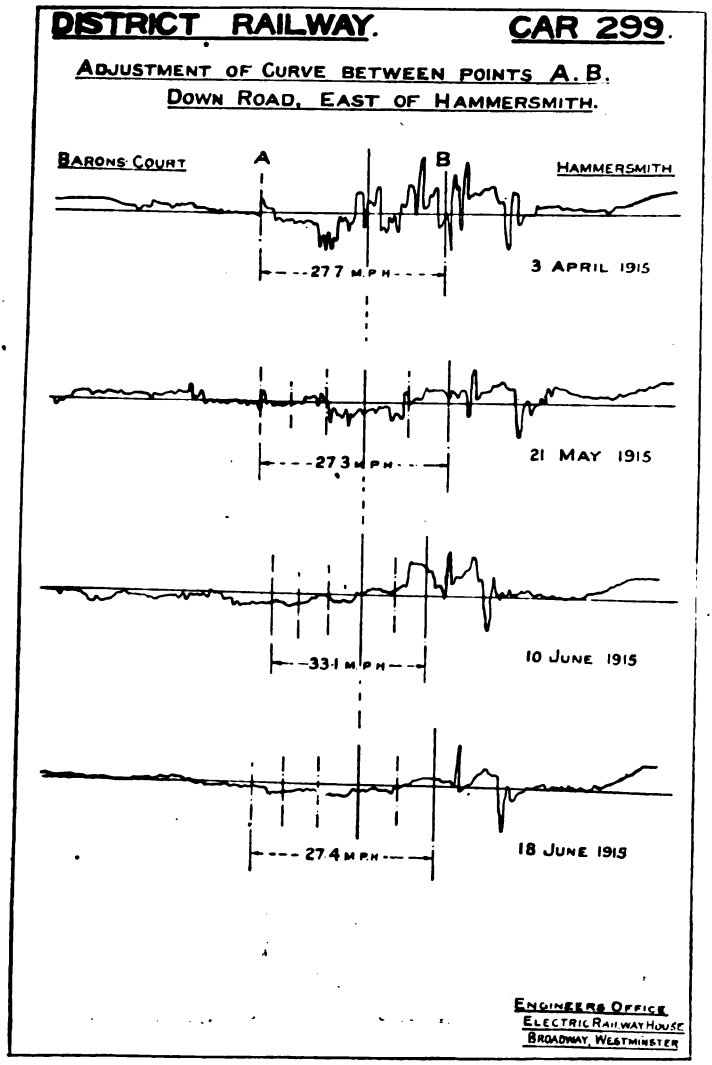
"Smooth-Running" Charts on the Underground Railways.

Reference was made recently to a paper read before the Permanent Way Institution by Mr. A. R. Cooper, Engineer to the "Underground" system of railways, dealing with engineer's maintenance on the lines under his oversight. An interesting feature which may now be mentioned is the practice of taking running diagrams to assist gangers in locating faulty places, and a series of these diagrams is illustrated, from which the improvement realised as attention is given will be clearly seen.

The top diagram records bad running between Baron's Court and Hammersmith; the next diagram, taken a fortnight later, shows some improvement, the third shows further improvement, and the last one records the running after full adjustment and realignment had been completed. It will be noted that the bad "kicks" on the first chart have been practically done away with. All these records were taken on the same car and at about the same speed.

Diagrams obtained in this way have a distinct value in comparing one section of the line with another, and form a useful record of the standard of maintenance, obtained in any section. Gangers are supplied with copies of the charts relating to their own sections, and are able to note the places where bad running is recorded;

Digitized by Google



CAR-RUNNING DIAGRAMS SHOWING PERMANENT-WAY IMPROVEMENT, METROPOLITAN DISTRICT RAILWAY.

diagrams taken three or six months later (on the same car and at the same speed) are also supplied to the gangers concerned, so that they can compare them and see the actual results of any special attention given to bad places. At the same time they realise that the company is aware of the improvement made. Each ganger is provided with a motor compartment pass and he is required to travel frequently over his section.

The Great Eastern Railway Musical Society.

THIS well-known Society was established in 1908. Beginning in quite a small way with an orchestra of about 20 and a male voice choir of 25, the Society has grown until it now boasts a full orchestra of 100 and a male voice choir of 220. A considerable proportion are employed in the various offices and works departments in the London area, notably at Liverpool Street station and at Stratford Works, but about one half of the choir comes from the principal provincial stations on the system, namely, Cambridge, Ipswich, and Norwich.

The Society has given many concerts during the 12 years of its existence, and on February 28, 1914, had the honour of performing before their Majesties the King and Queen of England, in the Royal Albert Hall, London. The orchestra also took a prominent part in a memorial service in St. Paul's Cathedral, London, on May 14, 1919, for the railwaymen of Great Britain and Ireland who fell in the war, and on July 8, 1919, provided the music at the service in St. Paul's Cathedral on the occasion of the public burial of Captain Fryatt who, whilst master of the Great Eastern Railway Company's ss. *Brussels*, was captured by the Germans and put to death by them. On July 12, 1919, they also provided the music in Ely Cathedral, Cambridgeshire, for the railwaymen in the Western Division of the Great Eastern Railway who fell in the war.

The orchestra is unique as an amateur organisation, inasmuch as it is self-contained, that is to say, it does not have to rely on professional help for any of the instruments; the choir also are, of course, all members of the staff of the railway company. Every grade of the railway service is represented, and the members come to the Society's rehearsals and concerts from the accountancy desk, the correspondence, ticket and drawing offices, the permanent way, electrical, stores and hotel departments, the station platform,

Digitized by Google

the printing works, the foundries, fitting benches, the machine and boiler and the many other workshops connected with locomotive, carriage and wagon building and repairing and motor engineering. "They are capable of building a modern railway express train, the track on which to run it and the signals to guard it; to mount the footplate of the locomotive, to print, issue and take the tickets, and in the absence, perchance, of a ticket to invoke the majesty of the law on the luckless passenger. They can cook a meal on the train, serve it, and in other ways ensure the comfort and convenience of those travelling by rail."

"Good Work Well Done."

The home of the Society is the Hamilton Hall of the Great Eastern Railway Hotel at Liverpool Street station, but concerts are frequently given elsewhere, in furtherance of the desire to spread the study of music throughout the line and to encourage various local charities. The Society also gives concerts on Sunday evenings in connection with the National Sunday League, thereby assisting the cause of music in London. Once a week each section of the Society meets for rehearsals. In London the Society meets at the Bishopsgate Institute where, thanks to the kindness of the Governors and their Secretary, Mr. Goss, suitable arrangements are provided. In the country districts similar arrangements are made. At each centre a musician of the highest standing trains the choirs, and professors are provided to give instruction in orchestral playing. Thus the Society is not only educating its own members but, by its efforts, is increasing the knowledge of music in the various districts.

The activities of the Society were suspended for a short time only during the war, as by the early return of members wounded, the inclusion of others of non-military age, and the assistance of the lady members of the staff, the Society was able to carry on, and many concerts were given to sailors and soldiers at naval stations, camps, hospitals, &c.

Lastly, but by no means least, the Society is fortunate in its Musical Director, Colonel W. Johnson Galloway, a Director of the Great Eastern Railway Company, whose enthusiasm and musical skill have been so largely responsible for the high standing the Society now has, both in regard to its railway associations and in respect of the superior level upon which its work is estimated musically. Mr. A. W. Headley, Chief Clerk, Chief Mechanical Engineer's Department, has for many years ably acted as General Secretary to the Society, and no small share of the success of its undertakings must be attributed to his energy and capability.

On Saturday, April 17, the Society gave public evidence of the high standard of musical excellence which it realises, at the Queen's Hall, Langham Place, London, when an ambitious programme was magnificently rendered by the combined London, Cambridge, Ipswich and Norwich choirs (230 voices), and the full orchestra of 100 performers. Colonel Galloway, who conducted, received quite an ovation from the large and distinguished gathering which filled the hall. During the interval the Right Hon. Lord Claud Hamilton, P.C., expressed very high appreciation of all that the Society has done, and of Colonel Galloway's splendid services. The latter replied in a few well-chosen remarks. Among the distinguished visitors present were the Lord Mayor of London and the Lady Mayoress, Sir Thomas and Lady Williams and Sir William and Lady Forbes, representing the London and North Western and London, Brighton and South Coast Railways, respectively; most of the directors of the Great Eastern Railway Company, Sir Henry Thornton, K.B.E., General Manager, and a large number of chief and departmental officers of the Great Eastern Railway, and representatives from other companies.

Railway Station as Ball Room.

ONE of the largest, as well as one of the most novel, dances ever held, was that recently given by the Canadian Pacific Railway, at the Windsor Street Station in Montreal, Canada, the occasion being the annual social re-union for the staff. Over 6,500 men and women guests were danced and dined and otherwise entertained from 9 p.m. to 4 a.m. There were two ball rooms, one being the main waiting-room 130 by 60 ft. in dimensions, where a fine orchestra played, and a first-class vaudeville show entertained the dancers between numbers. At midnight, after the last regular train had gone, the great concourse of the depôt, 350 ft. long by 60 ft. wide, was thrown open to the host of dancers. Moving pictures were given as the dancing progressed.

From 11 p.m. to 3 a.m. the dining-car service of the company did its best to feed 600 people every 15 minutes. Some 25,000 extra pieces of china were hired to supplement the regular stock, and 30,000 pieces of wearing apparel had to be checked and returned to their owners.

Mr. E. W. Beatty, President, made an appropriate speech of greeting. All the officials of the Canadian Pacific attended this entertainment and as many employees as could get away. The friendly spirit which inspired and carried the big enterprise to a successful conclusion was illustrated by this notice, placed conspicuously on the "timetable," as the programme was called: "The president will be glad to shake hands with anyone present. Introduce yourself."

Digitized by Google

MR. O. C. GATENBY, who, on April 1, succeeded Mr. T. C. Higgins as Mineral Manager of the Great Central Railway, entered the service of the Manchester, Sheffield and Lincolnshire Railway in August, 1892, and for several years held the position of Staff Clerk in the General Manager's office. In October, 1905, he was appointed Assistant Mineral Manager, with headquarters at Manchester, and subsequently, at Chesterfield. In July, 1909, he was transferred to Doncaster, and assumed control of the company's coal business in the South Yorkshire district, whilst in January, 1918, he was retransferred to the Mineral Manager's department at Chesterfield.

MR. O. C. GATENBY,

Mineral Manager,
Great Central Railway.

* * *

SIR GEORGE MCLAREN BROWN, the European general manager of the Canadian Pacific Railway, acted as chairman at the annual banquet of the company's officers recently held in Toronto. Five hundred representatives of the railway and of allied interests from the Atlantic to the Pacific were present. Mr. E. W. Beatty, the President, referred to the friendly spirit in which they welcomed the competition of the new national railway system, and expressed the belief that if that system were successful it would mean still greater prosperity for the Canadian Pacific Railway and Canada as a whole.

* * *

WE record with regret the death of Mr. W. T. Glendening, Assistant Locomotive Works Manager, London, Brighton and South Coast Railway, at the comparatively early age of 58. Mr. Glendening served his time in the Brighton works, starting in 1876, and on its expiration went to Scotland and thence to Newhaven to take up marine engineering. In 1887 he went to America, and in 1889 came back to the locomotive works at Brighton as assistant foreman in the fitting shop. Later he was made foreman in the wheel shop, and in 1907 (when he was presented with a handsome marble clock by the men) went to New Cross as Assistant Superintendent under Mr. L. Billinton. In 1911 he came back to Brighton with Mr. Billinton as Assistant Works Manager and Chief Outdoor Mechanical Inspector, a position he held until he died. His three sons are at present all working in the locomotive department at Brighton. For the last six years the deceased was the Chief Officer of the Brighton Railway Fire Brigade. The Glendening family have a long and creditable record in the service of the London, Brighton and South Coast Railway. The father of the deceased, Mr. J. Glendening, came to the Locomotive Works at Brighton with the late Mr. William Stroudley in 1870, as chief foreman boiler maker, and retired in 1892.

* * *

BY the death of Mr. Wilson Worsdell, who retired from the position of Chief Mechanical Engineer, North Eastern Rail-

Digitized by Google

way, in 1910, the great developments of the locomotive engine on the North Eastern system during the quarter of a century anterior to that date are recalled. For that period locomotive construction on the line in question was controlled and directed

THE LATE MR. WILSON WORSDELL,

Chief Mechanical Engineer,
North Eastern Railway, 1890-1910.

by one or the other of the brothers Worsdell. An illustrated article in the RAILWAY MAGAZINE, June, 1910, entitled "The Modern Locomotives of the North Eastern Railway," contained 24 locomotive illustrations in addition to the portrait of Mr. Wilson Worsdell and that of his successor, Sir Vincent L. Raven.

* * *

AN interesting function has taken place in the Liverpool Street Hotel, when a "Welcome Home," in the form of a Bohemian concert and presentation of "souvenirs" was given in honour of the colleagues of the Divisional Commercial Superintendent's Staff, Great Eastern Railway, Hamilton House, who had returned from the war. Mr. P Syder, Divisional Commercial Superintendent, accompanied by Mrs. Syder, presided. A fine musical programme, drawn entirely from the staff, and the good feeling of friendship which animated everyone, doubly assured the success which was well merited. During the interval and prior to the presentation, Mr. Syder, in a few well-chosen words, paid a glowing tribute to those who had served in "His Majesty's Forces." Mr. R. R. Pettit, chief clerk and other departmental chiefs, also extended their welcome, after which, speaking feelingly of those comrades who had made the supreme sacrifice, Mr. Syder asked that those assembled should stand in silence for one minute as a token of respect, and this was done amidst a solemnity which showed that although they were not there they were still very near. The presentation, consisting of silver cigarette cases, &c., was then graciously made by Mrs. Syder to the 36 recipients, to each of whom she extended hearty congratulations, at the conclusion of which Mrs. Syder was presented with a handsome bouquet by Miss Skingley, the youngest lady clerk. Mr. S. F. Hoggar (late 1st Royal Fusiliers), on behalf of the ex-service men, thanked Mrs. Syder for presenting the "souvenirs," also the staff for so generously contributing to the presentation. This was seconded by Mr. H. L. H. D. Bailey (late Royal Engineers). Mr. R. T. E. Hall (late 1st Royal Fusiliers) then requested Mrs. Syder to present to Mr. A. E. Moule a set of pipes, &c., as a mark of appreciation of his unfailing interest and efforts in connection with "Our Boys' Comforts Fund."

* * *

Mr. J. F. BRADFORD, Chief Assistant District Superintendent of the Southern

MR. J. F. BRADFORD,

Superintendent of the Central District
(Birmingham and South Staffordshire), L. & N.W.R.

Division at Euston, London and North Western Railway, was, on April 1, promoted to the position of Superintendent

Digitized by Google

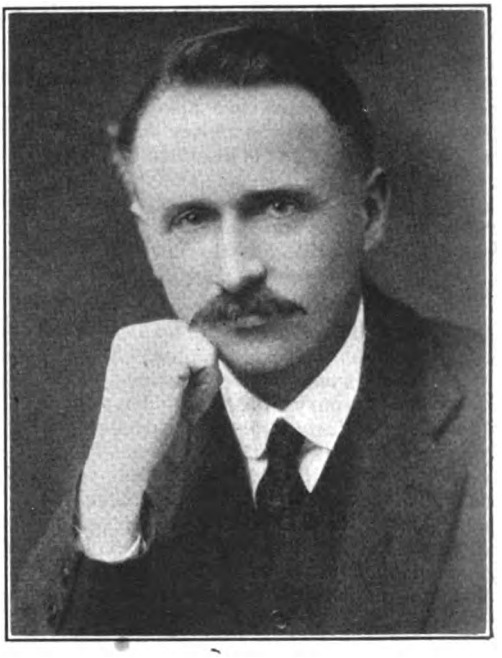
of the Central District (Birmingham and South Staffordshire). Throughout the war Mr. Bradford was acting District Superintendent of the Southern Division at Euston, and also Acting Traffic Superintendent of the North London Railway. Mr. Bradford is the son of the late Mr. H. M. Bradford, for many years Resident Engineer of the Central and South Wales Division. He joined the London and North Western Railway service in April, 1888, and after a complete training in both passenger and goods departments, and filling various positions in the Shrewsbury and Swansea Districts, he went in 1902, to Wigan as an Outdoor Assistant on the Northern Division. In June, 1903, when the late Mr. Walter M. Turnbull was appointed Superintendent at Liverpool, Mr. Bradford became one of his assistants. In July, 1910, he became Chief Assistant District Superintendent at Euston. Mr. Bradford has always taken a keen interest in signalling and block working. He was associated with a course of lectures at the Liverpool University on General Railway Economics, and after being transferred to London was the lecturer at the "Block" Classes at Euston during several winters prior to the war.

* * *

Mr. E. J. Prince, who was Stationmaster at Waterloo (London) all through the war has retired after 44 years' service with the London and South Western Railway. "The whirl and excitement of Waterloo during the war, when millions of troops were transported to embarkation ports and to home camps, has left me in a dazed condition," said Mr. Prince to a newspaper representative recently. "I am physically very fit, considering I am 60 years old. The war work thrown on the station officials was colossal. Eighteen hours a day left us in a state of exhaustion. Waterloo even now is not normal. We have 1,350 trains in and out of the station each day—most of them packed to suffocation. I have been acting as stationmaster for eight years, and I can honestly say each day has had its particular incident. I have not kept a diary, and—my brain is in a whirl. Yes, I have met countless 'personages,' but that was scarcely 'trying.' The real grinding work was with the khaki men crowding back from their leave on Sunday nights. We often ran 30 leave trains. Millions of soldiers were dealt with by the comparatively few employees at the station, and at the end of the war we were all dog tired."

* * *

Mr. T. W. D. Smith, Publicity Manager of the Great Central Railway, has been appointed by the Cardiff City Council as Development Agent for Cardiff. Mr. Smith's service with the Great Central Railway, which terminated on March 31, extends over a period of 31 years. He commenced his railway career with the Lancashire and Yorkshire Railway, and in October, 1888, was transferred to the Great Central Railway (then M.S. and L.), where he was employed in the Superintendent's Office. In 1902 Mr. Smith was sent to London to commence the publicity work under the General Manager (Sir Sam Fay), and was subsequently responsible for the Immingham Dock publicity campaign. Mr. Smith has paid several visits to the Continent on



MR. T. W. D. SMITH.
Development Agent for Cardiff.

publicity business. He is the author of several books on travel and trade development, and has a wide experience of trade matters at home and abroad. Mr. Smith, as a railway publicity man, proved himself to be exceedingly fertile in ideas. Originality, in fact, was the keynote of his work, which was always performed with excellent taste and keen business aptitude.

* * *

In connection with the 8.45 a.m. service from Victoria, South Eastern and Chatham Railway, an express train commenced, on April 15, running daily from Ostend to Vienna. The train travels *via* Cologne,

Digitized by Google

Frankfort, Nurnberg and Passau. It is due to arrive at Vienna at 10.55 p.m. the following day. A similar train runs from Vienna to Ostend by which passengers arrive at London (Victoria) at 9 p.m.

* * *

PROVISION of first-aid equipment on trains is recommended by Colonel Pringle in his report to the Ministry of Transport on the collision between a passenger train and goods train near Godley, on the Great Central Railway, on January 31.

"My attention," he states "has been called to the fact that, with the emergency tools and fire appliances carried in the brake van of the passenger train, there were no first-aid requisites. The need for bandages, &c., to dress the wounds of some of those injured proved urgent. Although ambulance stores, &c., are generally procurable at stations and are also available on breakdown trains when they arrive on the scene, a simple outfit is likely to be of service in the case of accidents. The addition of a small box of dressings to the emergency equipment carried on passenger trains, where not now so provided, is therefore desirable."

* * *

FIVE new members were elected at the April general meeting of the Railway Club at 92, Victoria Street, London, S.W. Mr. W. Parker presided, and at the conclusion of the ordinary business Mr. G. H. Palmer gave an address entitled "Some Welsh Border Light Railways," and it was plainly evident that in its preparation he had not spared the most painstaking research for documentary evidences nor stinted himself in the exploration of the lines his subject comprehended. Mr. Palmer acknowledged his indebtedness to Mr. A. W. Bartlett for locomotive history and to Lieut.-Colonel H. F. Stephens for much valuable general historical fact and information. Among those who participated in the discussion that followed Mr. Palmer's paper was Mr. T. R. Perkins, of Henley-in-Arden, who, having made a special study of the Welsh border railways, was able to contribute very aptly to the subject. On April 17, over forty of the members visited King's Cross engine sheds. Several long-distance country members attended. Shed Inspector Woolmer and Supt. Inspector Humphries courteously conducted the party. Railway club members will visit Willesden locomotive sheds on Saturday afternoon, May 15.

* * *

A MINIATURE railway (15-in. gauge) is being laid down in the amusement ground at the Hall-by-the-Sea, Margate. The railway has several interesting features, including a five-span Warren truss viaduct, 85 ft. long., and several other bridges over and under the line. Concrete unit block construction is being used for both the bridge piers, platforms and station-buildings. The engineer in charge of design and construction is Mr. Henry Greenly, A.I.Loco.E. Several new Atlantic locomotives are being built for this and the Rhyl line.

* * *

THE second geared turbine steamer intended for the Great Eastern Railway's Harwich—Antwerp service, has been launched at Brown & Co.'s yard at Clydebank, Scotland. The christening ceremony was performed by Lady Thornton, who named the vessel *Bruges*. The new boat has a cruiser stern, and is divided by watertight bulkheads into nine watertight compartments, fitted with Stone Lloyd's mechanically worked watertight doors, operated from the bridge and controlled by the captain. The vessel will have a *cabine de luxe* on the boat deck, a dining-saloon on the upper deck, will be fitted with wireless telegraphy, submarine signalling, and all the modern improvements in respect to lighting and the thermo-tank system of heating and ventilation. The vessel, which is 330 ft. long over all, 43 ft. broad, will have a speed of 21 knots per hour and accommodation for over 360 passengers. A special feature is the number of single berth cabins; the largest part of the remainder being two-berth cabins.

* * *

MR. J. P. BARDSLEY writes that the statement made recently that Webb compound 4-4-0 engines do not now work north of Preston, is not quite correct. No. 1903, *Iron Duke*, regularly works the 12.55 p.m. from Preston to Morecambe, returning with the 4.20 p.m. He has also seen others of these engines working goods trains over this section. Engines of the converted "Renown" class are also seen regularly on the section. We may point out, however, that the statement was a general one, and with particular reference to the main line working, but in the interests of accuracy Mr. Bardsley's comments are welcomed.

* * *

FROM Crewe Mr. C. Williams writes:—A new series of 4-6-0 passenger engines ("Prince of Wales" class) are now being turned out at Crewe as follows:—Nos. 35, 487, 1178, 395, 889, 1113, 1408, 1422, 1478, 1535, 1542, 1549, 1557, 1694, and 2516. As will be noticed the series consists of 15 engines, which brings the total of the class up to 155. The next new engines will be a series of four-cylinder passenger engines—"Claughton" class. It is reported that one

Digitized by Google

of the four-cylinder compound passenger engines now being converted to simple will be provided with the Schmidt superheater. No. 1882 is the latest four-cylinder compound mineral engine to be simplified and superheated, and in addition is provided with piston valves. No. 2097, one of the "Claughton" class locomotives, hitherto unnamed, has been named *Patriot*, as a tribute to the London and North Western employees who served in the European war, 1914-18. Another of the 4 ft. 6 in. 2-4-2 tanks has recently been sold to the Wirral Railway, No. 889. The following engines have recently been broken up :—Nos. 1177, *Princess Louise*, a 6 ft. 6 in. "Jumbo"; Nos. 194 and 972, 5 ft. 0-6-2 tanks; Nos. 69, 178 and 1257, 4 ft. 3 in. 0-6-2 tanks, and Nos. 3044, 3068 and 3154 DX goods. Side tank coal engines Nos. 958 and 2356 have been adapted for motor work.

* * *

THE Minister of Transport, in pursuance of his powers under the Electricity (Supply) Act, 1919, has appointed Sir Harry E. Haward, Comptroller of the London County Council, to be a Commissioner under the Act.

* * *

THE Ministry of Transport makes the following announcement in regard to the railway congestion due to the detention of wagons to which attention has been repeatedly called by the Minister of Transport. Very gratifying results have followed the increase of the demurrage charges on railway companies' trucks which became operative on January 1. The figures for February which are now available, show that wagon detention has decreased by 42 per cent. as compared with December, representing a saving of over 150,000 wagon days.

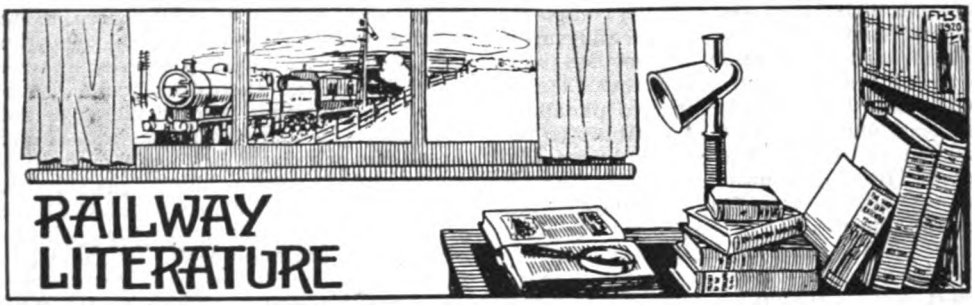
* * *

IN view of the fact that their war-shortened fleet is now regaining something like its pre-war strength, the London General Omnibus Company give notice that they are in a position to accept a limited number of orders for "private hire" motor 'buses for private parties visiting the races, the theatres or the country resorts round London. The motor 'buses, which may be chartered for "private hire," have the usual seating arrangements—18 on top, 16 inside, or 34 in all. For visiting a race-meeting the motor 'bus is an improvement even on the most luxurious "four-in-hand." It is faster, it constitutes a ready-made "grand stand"; and it provides far more effective shelter against the incidents of weather. It can make its way to a position right "on the rails." If the theatre is the objective the 'bus will collect its complement of passengers from house to house or at any agreed rendezvous, take the whole party to the theatre, wait for them after the play, and take them on to supper at the restaurant of their choice, and thereafter home to their various destinations. For a picnic or holiday party, whether coming into London for the day or going from London out into the country, the "private hire" 'bus solves in the most delightful way possible all the problems of getting from the point of assembly to the desired objective and back again. For smaller parties the London General Omnibus Company hope shortly to be able to cater by means of specially-appointed chars-à-bancs, seating 28 persons, and early delivery of a number of these new vehicles is promised. The charges, naturally, depend to some extent upon the itinerary; but quotations for inclusive prices may be obtained by intending hirers of motor 'buses on application to the Passenger Agent, "Private Hire" Department, at Electric Railway House, Westminster.

* * *

FROM Bath Mr. L. B. Hewitt writes :—I am able to supplement the particulars given by Mr. E. L. Ahrons last month concerning the Great Western 4-4-0 locomotive of the "Badminton" class, *Earl Cawdor*. The engine was fitted with the standard coned boiler—this constituting a second re-building—towards the end of 1906. In the RAILWAY MAGAZINE for February, 1907 (Vol. XX, page 105), the late Mr. Charles Rous-Marten gave a list of 16 of the 20 locomotives of the "Badminton" class which had received domeless coned boilers, and *Earl Cawdor* was included in this list. This locomotive was illustrated in the form described by Mr. Ahrons in the RAILWAY MAGAZINE for November, 1903 (Vol. XIII, page 364). Mr. Ahrons has mentioned the North Eastern pattern of cab, and the general appearance of the engine in this form was certainly very similar to that of the North Eastern 4-4-0 locomotives of the "R 1" class built by Mr. Wilson Worsdell. The outside frames and the more pronounced forward extension of the smoke-box in the case of the Great Western engine were the most noteworthy points of difference. In her earlier days *Earl Cawdor* was occasionally used for working Royal trains, and in 1899 worked through from Windsor to Folkestone, hauling a train carrying the late Queen Victoria. To enable the run to be made without a stop the tender tank was enlarged at the back.

Digitized by Google



RAILWAY YEAR BOOK, 1920. [Railway Publishing Company, Limited, 30, Fetter Lane, London, E.C. 4.] Price 5*s.* net.; by post 5*s.* 9*d.* For the twenty-third consecutive year this valuable annual has been issued by its publishers and in spite of the increase in the cost of printing and paper it is a bigger book than in any former year. RAILWAY MAGAZINE readers, who possess, or who have access to a complete file of the *Railway Year Book* since it was first published in 1898, are aware that the development of this "hardy annual" year by year has been consistently maintained. The current edition, therefore, not unexpectedly constitutes a notable advance upon all its predecessors.

Foreign and Colonial railways have been given more space than in previous years, and as a consequence much additional information concerning railways overseas has been embodied in this standard railway reference work.

For the larger railways in India, Africa, Australasia and Canada and the principal lines in South and Central America where British interests are involved, particulars of the responsible personnel, leading statistics and information of a general character, are given. In the case of smaller systems, corresponding facts and figures are rendered conveniently available, though on a reduced scale. In combination with the new maps relating to these overseas sections the result is a concise compendium of valuable information. Tabular particulars are given for the remaining railways within the Empire; also those in Asia (apart from India), and South and Central America.

The home railway section of the book includes many improvements. To the series of fifty railways of which complete details and historical sketches are furnished, another has been added—the increasingly important Alexandra (Newport and South Wales) Docks and Railway. In regard to the fifty-one railways thus presented much more complete information is now given concerning rolling-stock and equipment, passenger and goods traffic, mileage, &c., embracing many particulars which could not be made public during the war.

Consequent upon the establishment of the Ministry of Transport the book includes a review of its functions and responsibilities, while by the courtesy of the Ministry there is provided a complete statement of its organisation and personnel.

Another innovation is the series of dimensioned diagrams setting forth the loading gauges of principal British railways, in conjunction with the Berne standard gauge and the proposed International gauge.

Newly incorporated tabular statements include classified passenger and freight statistics applying to all railways where the totals are of considerable magnitude, particulars of privately-owned railway wagons, &c., while new sections in regard to air-brake systems used on the world's railways, and power signalling on British railways, should be useful.

All standard features have been conserved, but they have been revised and brought up to date. A number of additional railway societies and institutions are included in the section devoted thereto. A conveniently compiled "Buyers' Guide" will be appreciated by trade and technical subscribers, The "Who's Who" section has been developed to include personnel of the Ministry of Transport. Many new biographies have been added, and the older ones revised.

With its mass of succinctly set forth information and its forty-three maps, the *Railway Year Book* provides such a plethora of railway facts and railway figures that no railway library or railway officer's bookshelf is complete without it.

Digitized by Google

FIFTY YEARS OF RAILWAY LIFE IN ENGLAND, SCOTLAND AND IRELAND. By Joseph Tatlow, Director, Midland Great Western Railway of Ireland and Dublin and Kingstown Railway, a Member of Dominions Royal Commission, 1912-1917; late Manager, Midland Great Western Railway, &c. [THE RAILWAY GAZETTE, Queen Anne's Chambers, Westminster, S.W. 1.] Cloth, 224 pp. Price 10*s.* net; by post, 10*s.* 9*d.* Fifty years of railway life, passed in the service of various companies, large and small, in England, Scotland and Ireland, in divers capacities, from junior clerk to general manager, and ultimately to the ease and dignity of director, provides the subject-matter for an autobiography that will engage the attention and evoke the sympathy of its readers. As opined by the author in his introductory chapter most autobiographies are undertaken to please the writers and he frankly confesses that this was the case with him; but he expresses the hope that what he has found much pleasure in writing his readers may at least find some satisfaction in reading. In this Mr. Tatlow is not likely to be disappointed, for not only has he succeeded in producing a very readable book, but one in which he has included a vast amount of valuable information and real live human interest.

The author takes his readers back to the spacious mid-Victorian era—the days of "Champagne Charley," of ladies who could still blush, and of velvet smoking caps and elastic side boots. Happy times they must have been. "Strikes sometimes occurred" says Mr. Tatlow, "but were not frequent." In another chapter he records paying income-tax at the rate of threepence in the pound.

Mr. Tatlow began his railway career in the year 1867, at sixteen years of age, as a junior clerk in the Midland Railway service at Derby. Subsequently he served the Glasgow and South Western Railway as assistant to the general manager. In that position he met, from time to time, not only many prominent railway men, but also other men of mark. After eighteen years of railway life, at the age of 34, he attained the position of general manager of the Belfast and County Down Railway, and in 1890 he left that railway to enter upon the duties of manager of the Midland Great Western Railway.

An autobiographer, as the author admits, exposes himself to the charge of egotism, but Mr. Tatlow is willing to take the risk of that, and we are glad, although at the same time we freely acquit him of any undue vanity. His railway career, as set forth in his book, was an undoubted, but well-deserved, success, and although he has much to be proud of, he is never betrayed into magnifying his own importance. Everything to his credit is recorded in good taste and with a becoming modesty. In spite of this, however,

Elliott] [*& Fry.*

Mr. JOSEPH TATLOW,
Author of "Fifty Years of Railway Work in England, Scotland and Ireland."

the reader cannot help being impressed by the happy possession by the author of an infinite capacity not only for taking pains, but also for making friends.

The book, including the frontispiece, which is a portrait of the author, contains 12 illustrations. In addition to the social life of railway workers and others it deals with railway history, railway progress, general railway Acts of Parliament, terminals, rates, fares, railway legislation, the block, the brake, light railways, &c.

The development of Irish railways has received the author's careful attention. He remarks: "The Irish railways have been brought to such a financial condition that if they were handed back to the companies many of them not only could not pay dividends, but would be unable to meet their fixed charges, whilst some would not be able to even pay their working expenses."

Mr. Tatlow, while in the railway service, had much to do with general journalism and to that relating to the industry, and he has recorded his long connection with *The Railway News*, a weekly newspaper, now incorporated with the *Railway Gazette*. His book, likewise, includes particulars of trips

Digitized by Google

to Spain, Portugal, and other countries, together with much that is of value in regard to the Vice-Regal Commission on Irish Railways, 1906-1910, and the Dominions Royal Commission, the Railways of the Dominions and Empire Development.

In conclusion, it must be said that railway literature is indeed the richer for Mr. Tatlow's able contribution to the railway bookshelf. Railway officers of mature years will read his work with advantage and sympathy, while those of the rising generation will glean from its pages a wealth of inspiration that should stand them in good stead in their upward march to the higher positions in the railway industry.

HISTORICAL SKETCH OF STATE RAILWAY OWNERSHIP. By W. M. Acworth. [John Murray. Price 3s. 6d. net.] Based upon a short summary prepared for the Railway Executives' Advisory Committee, a body corresponding in the United States to our Railway Companies' Association, this book gives, in Mr. Acworth's usual concise fashion, a brief yet relatively very full *résumé* of methods and conditions of State railway ownership in various countries. It will be welcomed by all students of the subject by virtue of its wide range and careful selection of useful reference material to the exclusion of extraneous matter, especially as it collates data and information which usually has to be sought individually. Mr. Acworth is a master of his subject, but he makes it quite clear that he does not view railway nationalisation, as a principle, with favour. In regard to inventions and improvements, he says: "In all the history of railway development it has been the private companies that have led the way; the State systems have brought up the rear." Again: "Railway history conclusively refutes the idea that State ownership promotes railway development." In the United States and the United Kingdom—the more important half of the railway world by virtue of traffic volume:—"It will not be suggested that State ownership is necessary for political and military reasons . . . Nor will it be suggested that in these two countries private enterprise has fallen short of meeting the public requirements." On the basis of tariffs, analysis fails to support the contention that under State ownership and operation the cost of transport is less than under other conditions. Instead, as Mr. Acworth shows, while rates may be low they do not constitute the whole cost of transport, and when all factors are considered the balance of fact is in favour of private enterprise. In conclusion Mr. Acworth claims as the essential lesson of history that "It is impossible to obtain satisfactory results on Government railways in a democratic State unless the management is cut loose from direct political control."

THE STORY OF THE CANADIAN PACIFIC RAILWAY. By Keith Morris. [William Stevens, Ltd. Price 1s.]

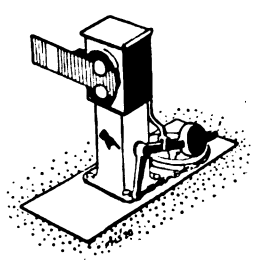
This is a cheap edition, in paper covers, of a volume first published in 1916. From its first inception until through Atlantic-Pacific connection was given entirely through British territory in May, 1887, the story of this great undertaking is interestingly told. The statistical supplement is revised to date.

LAND IN BRITISH COLUMBIA. By the Rev. R. G. MacBeth, M.A. [William Stevens, Ltd. Price 1s.]

This brochure will appeal to all interested in Canadian affairs, the outlook in the Dominion, and the prospects of the intending settler. Statistical and trade aspects are comprehensively considered.

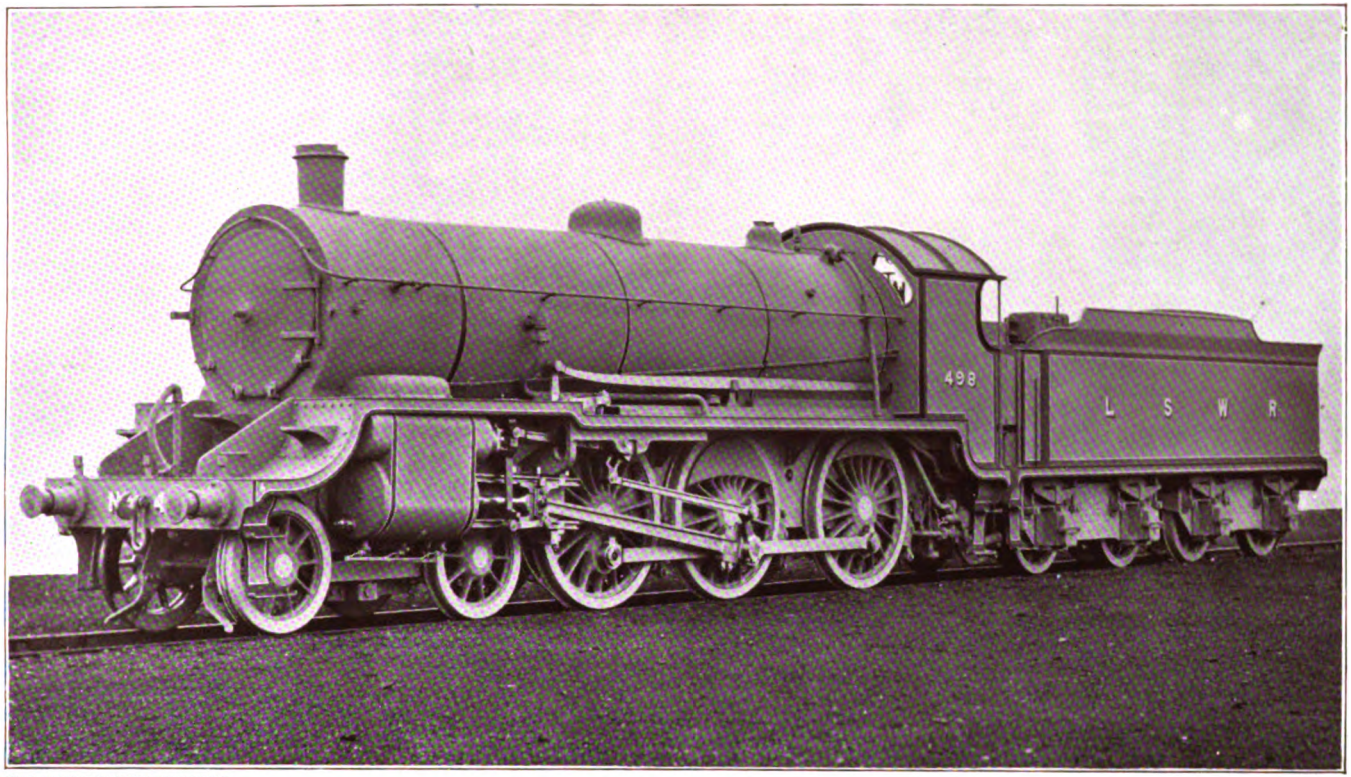
INDIAN PORT AND TELEGRAPH MAGAZINE.—The first issue of this monthly publication is to hand. A number of interesting contributions are included, and from the railway point of view we note a reproduction of Rudyard Kipling's poem "The Overland Mail," and an article describing the mechanical handling of mails in the G.P.O., London The magazine is mainly issued for the staff and therefore contains also staff news and items of a general character suited to its scope.

CASSELL'S ENGINEERS' HANDBOOK. A new series in fortnightly parts, price 1s. net each issue, dealing with facts and formulæ, principles and practice of engineering.



Digitized by Google

Digitized by Google



THE RAILWAY MAGAZINE.

LONDON & SOUTH WESTERN RAILWAY 4-6-0 EXPRESS GOODS LOCOMOTIVE, No. 498.

Designed by Mr. R. W. URIE, Chief Mechanical Engineer.

Cylinders, 21 in. diam., 28 in. Stroke. Coupled Wheels, 5 ft. 7 in. diam. Bogie Wheels, 3 ft. 7 in. diam.
Heating Surface: Tubes (small), 1,252 sq. ft.; Tubes (large), 464 sq. ft.; Firebox, 162 sq. ft.;
Superheater (Eastleigh type), 308 sq. ft.; total, 2,186 sq. ft.; Grate Area, 30 sq. ft. Steam Pressure, 180 lbs. per sq. in.
Weight in working order: Engine, 77 tons 8 cwts.; Tender, 57 tons 13 cwts.; total, 135 tons 1 cwt.

Digitized by Google

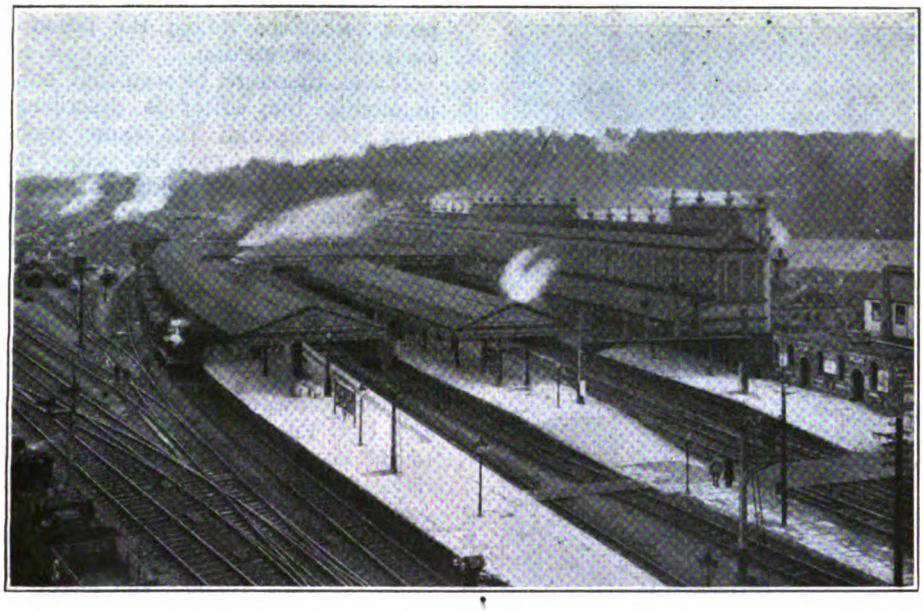


Photo.] [*G.W.R.*

GENERAL VIEW OF ST. DAVID'S STATION AS RECONSTRUCTED.

Notable Railway Stations and their Traffic:

ST. DAVID'S, EXETER, GREAT WESTERN RAILWAY.

By J. F. GAIRNS, M.I.Loco.E.

IN THE RAILWAY MAGAZINE for October, 1907, Mr. Alfred W. Arthurton described this well-known station. But the St. David's Station of that article was a very different erection from that which now calls for attention. There is, in fact, little more remaining than the frontage and the offices along the main down platform; while the St. David's of to-day is essentially different in design, and in many respects in accommodation also, from the St. David's described thirteen years ago.

The intervening period has seen, too, many important developments in traffic, though this is more particularly in respect of magnitude than of character, seeing that most of the principal train services which applied until war necessities caused their reduction, were already in existence in 1907. The Westbury direct route had been opened the previous year, so that even then the "Cornish Riviera" express held the "blue riband" of Great Western traffic, and there were also London-Exeter three-hour and London-Bristol two-hour trains to arouse travelling enthusiasm. The London and South Western Railway also had nearly the same West of England expresses using or passing through St. David's.

But the years which have passed have seen great developments in trains and traffic; 70-ft. coaches have become the rule on all principal Great Western expresses to or from London, and whereas six or eight clerestory or earlier elliptical-roofed coaches usually constituted an express train at St. David's in 1907, the principal services are now frequently made up of from 12 to 15, and often more, of the largest modern vehicles, the numbers of passengers showing corresponding increases. Indeed, in the height of the season, speaking, of course, of a normal year, but applying very largely even under present conditions, the numbers of passengers conveyed by these trains has on

Digitized by Google

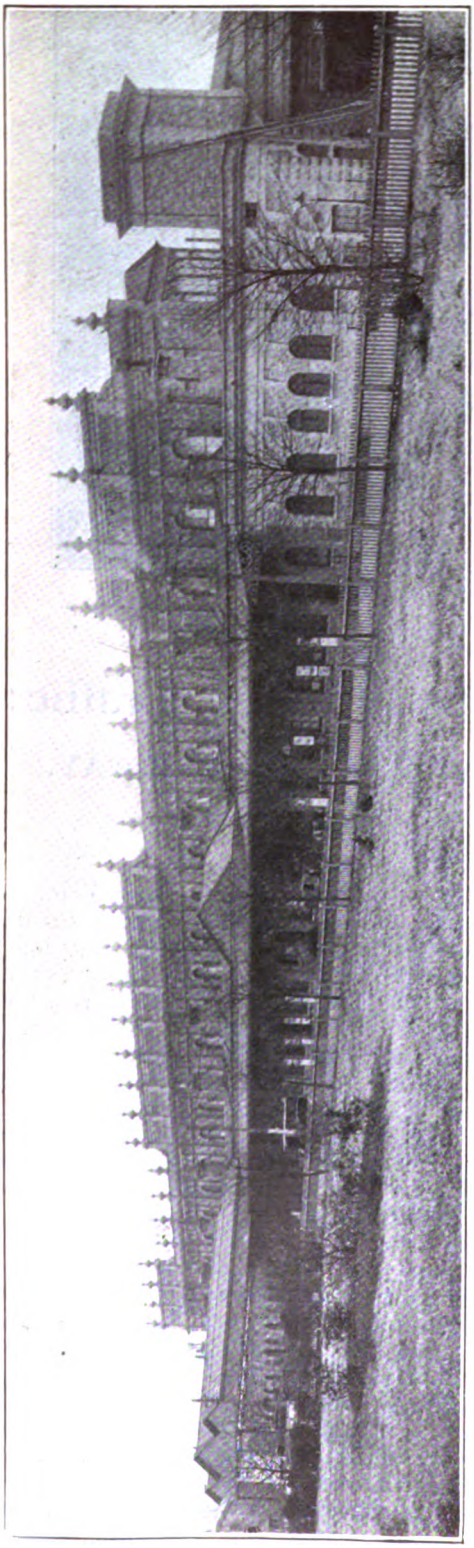


Photo.] GENERAL VIEW OF ST. DAVID'S STATION, EXETER. [G.W.R.

many occasions taxed the resources of even the new station.

It will, therefore, be seen that although nominally the writer is describing the same station and the same traffic as were dealt with in 1907, the subject matter is, in fact, essentially different, while the engineering interest of the reconstruction, whereby a new station has been created while maintaining traffic working uninterruptedly, affords further justification for consideration anew.

Railway station premises at Exeter date from 1844, when the Bristol and Exeter Railway opened their station at Red Cow Village, on the western outskirts of the city, as usually happened in those days, when local authorities and landowners considered it good policy to keep railways well away from the "sacred precincts." Incidentally, the railway company thus avoided the heavy grades which direct access to the centre of the city would have entailed, as evidenced by the well-known 1 in 37 incline and tunnel which the London and South Western Railway has to face as the penalty for locating their station centrally in Queen Street.

The original station consisted only of a primitive structure; but a little further west a more substantial building was erected to serve the South Devon Railway when it was opened in 1848. There was at first no direct connection, but in due course the metals were joined up, and one station used for down trains and the other for up trains. The principal station in Exeter of the South Devon line was, however, that at St. Thomas, the extension to St. David's and the bridge over the River Exe being mainly for interchange purposes. To this day St. Thomas Station, from outside, suggests a far more important station than it really is, though it has considerable local value, seeing that it is adjacent to the more industrial districts of the city.

The station recently displaced was erected in 1862, and, with its imposing buildings—retained in reconstruction—ranked as one of the finest of provincial stations. The old South Devon station is still in existence as a carriage shed, and several of the yard buildings to the east of the station are relics of early Bristol and Exeter days.

Digitized by Google

At the west end of the station is one of the engine houses installed when the South Devon line was operated on the atmospheric system. This has been used for many years to accommodate an oil-gas train lighting plant, all passenger trains, loaded or empty, passing to or from the West of England being "oil-gassed" at Exeter unless, of course, they are electrically lighted. Incidentally, it may be mentioned that Trinity House Admiralty buoys are regularly sent here from Penzance to be charged from this installation. Travelling gas tanks are also supplied for transit to all out-stations west of Bridgwater, where vehicles may require to be charged. Of a slightly later date is the old tranship shed, used when Exeter became the limit of the mixed-gauge.

It was in 1860 that the London and South Western Railway reached Exeter (Queen Street), but their running powers through St. David's are operated under an agreement made with the Bristol and Exeter Railway, dated 1859. The erection of the station of 1862 was, in fact, partially due to this agreement, and this also provided for user by the London and South Western Railway of the then Bristol and Exeter line from St. David's as far as Cowley Bridge Junction, 1 mile 22 chains in the direction of Taunton. The Crediton Railway was opened May 12, 1851, as broad gauge, and for a short period was worked by the Bristol and Exeter Company. Running powers are, in fact, still held, though rarely, if ever, exercised by the Great Western Railway. This line was taken over and worked as a narrow-gauge line by the London and South Western Railway from February 1, 1862. Okehampton was reached in 1867; Bideford, March 2, 1863; the Torrington branch in 1872; the Ilfracombe line in 1874; Devonport in 1876; from Okehampton to Holsworthy in 1879; other "West Country" lines following in due course until the whole of the London and South Western system was built up, calling for the important train services now worked over the Great Western Railway through St. David's Station by virtue of this agreement of 1859.

No fewer than ten substantially distinct routes centre upon St. David's Station. From the east* converge (1) the direct London services *via* Westbury; (2) the London, North of England, Midlands, Welsh and other services *via* Bristol (both of these send all West Country traffic, except to North Devon, through Exeter); (3) the Tiverton and Dulverton branch; and the London and South Western routes from (4) Plymouth, (5) Bude and Padstow, and (6) Ilfracombe and Torrington. To the west there is (7) the connection to Queen Street and the South Western system *via* the 1 in 37 incline and tunnel, and the Great Western routes to (8) Plymouth, Penzance and Cornwall, (9) to Torquay and Kingswear (this may legitimately be considered as distinct from other services), and (10) the branch to Heathfield. Some of these are worked as combined trains through Exeter; but they require setting out in this way to indicate the traffic importance of Exeter.

In addition, while Exeter itself has no great industrial importance on its own account, it is mainly as the great distributing centre for Devon and Cornwall that it takes a leading place from the commercial and trading point of view, and is generally selected by commercial travellers as a convenient residential and "starting-off" place for business in the south-western counties. With tourists, too, this ancient city, with its beautiful and in some respects unique cathedral, the grounds of Rougemont Castle and Northernhay, the attractions of the River Exe, and its historic associations, constitutes a splendid centre, and is so regarded by large numbers of visitors who stay for a few days in Exeter itself before proceeding further west, or make it their headquarters for tours to the numerous places of interest usually accessible by rail, road, river and sea. The city has much to commend it residentially, while its buildings, ancient and modern,

* Strictly speaking, one can neither use the terms "East" and "West," nor "Up" and "Down,' 'seeing that the Great Western Railway proceeds here approximately north and south, while down Great Western trains travel the same way as up London and South Western trains, and *vice versa*. As, however, Great Western traffic proceeds eastwards and westwards, these directions may be adhered to, occasional necessary reference to north and south being bracketed thus: "East (north)."

Digitized by Google

and thoroughfares provide endless interest.

The station which is now displaced concentrated most of its artistic beauty in the frontage already referred to. Internally it was by no means as well equipped or convenient as modern traffic demanded. Like most of the older stations on the western lines of the Great Western Railway and its component companies, it had an all-over roof, and beneath this were five tracks. The principal platform served the down Great Western line, and as this was adjacent to the station buildings, most of the station offices were here, other platforms not being so well served. In the centre was an island platform, used principally by London and South Western trains, those towards Queen Street and London travelling in the same direction as Great Western down trains, though ranking as up trains from the London and South Western Railway point of view. Down South Western trains used the other side of this island, but they were also alongside a second island platform, the outer face of which served up Great Western trains. This was convenient for passenger and luggage transfer, but equal facilities were really required on the down side, while the narrowness of the island platforms and the absence of transfer facilities for luggage, &c., did not conduce to traffic convenience. The remaining line was in the nature of a siding, useful for combining sections of trains and attaching through coaches running from Exeter to various parts of the country. Access to the island platforms was had by means of a footbridge from the main down platform. A bay at the east end of the down main platform provided for Tiverton and Dulverton branch trains.

The old roof, erected in 1861 to designs prepared by the late Mr. Francis Fox, had a span of 132 ft., and was 363 ft. in length. The walls extended upwards to support the roof at about 34 ft. above rail level.

Plans for reconstruction were considered in 1908, but it was not until 1911 that work was seriously commenced. Briefly, the scheme involved the entire removal of the "all-over" roof and the further wall supporting it, the provision of a down through line, the construction of two new islands, one to serve for all London and South Western traffic, though used also for Great Western trains, and the further one to give two platform lines for up Great Western trains. In addition, adequate station buildings were to be erected on these islands, while, besides the footbridge for passenger transfer, a luggage bridge, with electric lifts, was to be installed to connect all platforms. As thus constituted, there would be three down and three up lines through the station, with the Tiverton bay as before. These gave six platforms in all, as one of the down lines would not have a platform face.

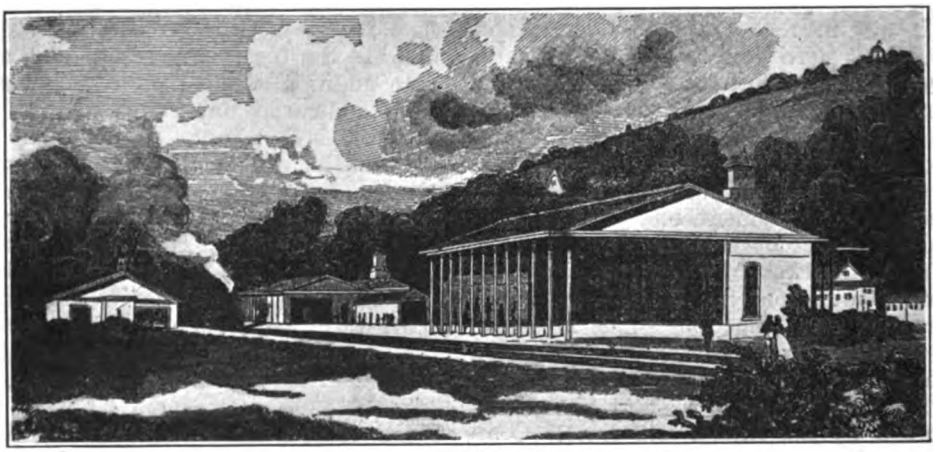


Photo.] THE ORIGINAL BRISTOL & EXETER RAILWAY STATION. [*G.W.R.*

Digitized by Google

The carrying out of this scheme was no light undertaking, as the new islands largely occupy sites where originally running lines were laid, and *vice versa.* The first stage was to erect a temporary platform outside the further retaining wall, to enable trains to be diverted thereto, with temporary buildings. Part of the centre work was then dealt with. In fact, all the roads were laid in by degrees, until there were two lines available for running a gantry for taking down the roof, in addition to equivalents to the four platform lines essential to traffic working, as in the old station. This involved many temporary expedients and track diversions; but the full story of the engineering work involved, fascinating as it is, is too lengthy for reproduction here.

The old roof was removed section by section, trains meanwhile working below the gantry until the outer wall could be demolished and the remaining stages of the work undertaken. This was the subject of a contract made with Messrs. C. H. Hunt and Sons, of High Wycombe, this firm also undertaking the erection of new platform coverings, new station buildings, new passenger footbridge, and the luggage bridge, the last-mentioned being equipped with electric lifts.

The old frontage is retained intact, and there is relatively little alteration on the down main side beyond platform shelters necessitated by the removal of the all-over roof and the wing walls at both ends of the old station buildings. The position of the passenger footbridge is slightly different from that of the old one, while the luggage footbridge and new lavatory accommodation to permit of extension of the parcels office, involved other changes. As the lay-out of the station necessitated important changes in the signalling, entirely new equipment was necessary, and this involved interesting features.

The down main platform (No. 1) is 1,007 ft. in length and has a bay at the east end, used for branch trains. Alongside are carriage and horse-loading docks, with direct access to the courtyard adjacent. The bay and dock lines abut upon a neat red brick building, accommodating the staff of Mr. C. A. Patey, District Traffic Manager in charge of the Exeter district. A corresponding building a short distance away, and detached from the station, is devoted to the commercial work of the goods department.

The old buildings are utilised for the usual station offices, booking halls, refreshment and dining rooms, &c., there being also a large double-arched passage way for luggage labelling and for passengers not requiring to pass through the booking office.

The passenger footbridge is approached by double stairways, convenient respectively for the booking offices and the passage ways, and at the head of these stairways, placed so as to show two diagonal faces, is the large station clock which, with four faces, used to be a prominent feature on the footbridge adjacent to the middle platform.

The new roof on the down platform consists of two distinct coverings of about equal areas erected at different levels, the "upper" having its supports practically on the same level as the old roof, and the "lower," a cantilever roof, carried at the same height as those erected on the island platform. The space between the upper and lower coverings is closed by a vertical screen consisting of muffled plate glass set in ornamental iron frames of the Fenestra type.

The chief factor governing the design is found in the existence of the main frontal wall which formed the support for the old station roof. The removal of the wall, a handsome architectural feature forming one side of the office buildings, was not necessitated by the alterations in contemplation, and the adaptation to it of the type of covering described resulted in the preservation of the architectural features of the station frontal, incidentally adding pleasing characteristics to the station construction as a whole.

Next to No. 1 platform line is the down through line with scissors connections therewith near the east (north) end. Then comes No. 3, generally reserved for up London and South Western Railway trains, though available also for down Great Western trains. All London and South Western Railway up trains exceeding 40 wheels have to be banked in rear from the platform, and at the east (north) end trailing connection is made with a spur for London and South Western Rail-

Digitized by Google

way banking engines. The other face of the "middle" island (No. 4 platform) similarly accommodates down London and South Western Railway trains and up Great Western Railway trains, and has facing connection with the bank engine spur, this being useful, further, in that by setting No. 4 line for the spur an up Great Western and a down London and South Western Railway train can be accepted simultaneously—a valuable facility when traffic is heavy. This platform is also signalled for Great Western departures towards the west (south), as it is occasionally convenient to bring terminating local trains from the west into this line and despatch them again without shunting to another line.

The middle platform, 900 ft. in length, has only cover shelters, but the outer island, used for up Great Western trains, has three stone buildings for waiting rooms, refreshment rooms, &c.

The structures are built entirely of Nailsworth stone above a plinth course of Cornish granite, standing 1 ft. 3 in. above platform level, and upon foundations carried down to the gravel (found at an average depth of about 12 ft. below platform level). The walls are of plain ashlar, divided into panels by plain pilasters and decorated with moulded strings and massively-formed cornices. Circular and elliptical arches formed with voussoirs of the same stone, carrying label courses and moulded edges, support the super-incumbent masonry over the doorways and the generously-proportioned window openings.

The new coverings on the island platforms are of the standard Great Western type. The superstructure is carried entirely by a double row of columns on the middle platform, whereas on the up platform the support is given partly by columns and partly by the new buildings. They are intersected by the new footbridge covering near the mid-point of their length, and are terminated at their northern extremities by the luggage bridge.

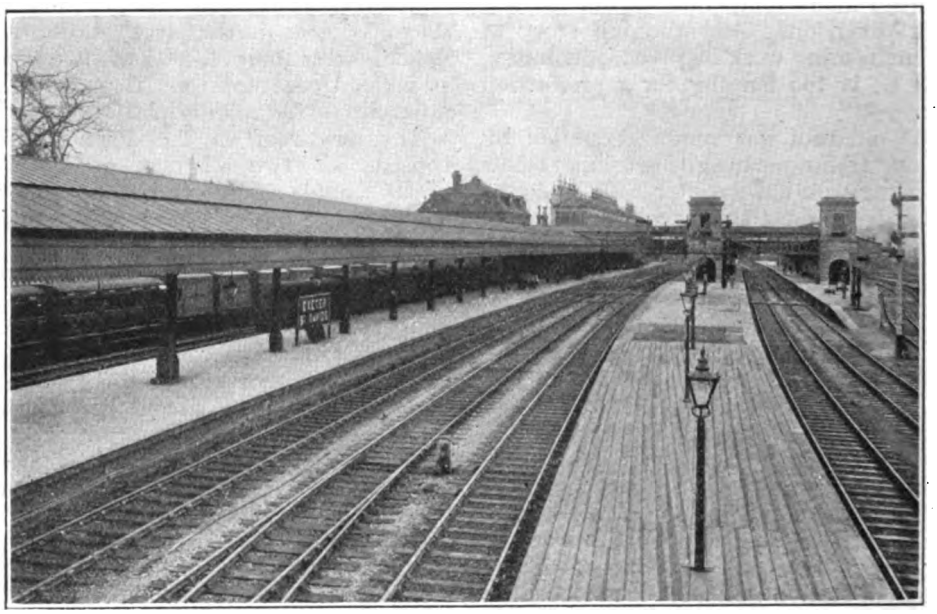


Photo.] [*G.W.R.*

MAIN PLATFORM SHOWING DOWN THROUGH LINE IN CENTRE.

On the frontage the main walls of the latter were carried up above the bearings of the old roof to form a parapet, and are surmounted by a number of ornamental stone urns. The entire frontage constitutes a handsome and imposing piece of architecture, and the decorative charac-

Digitized by Google

teristics are reproduced in the new buildings.

The luggage bridge consists of four lattice girders, carrying a floor 9 ft. in width, consisting of steel troughing filled with concrete surfaced with asphalt. The girders are carried partly by cast iron columns standing upon the platforms and partly by steel standards built into the masonry of the lift towers. Access between the platforms and the bridge is obtained by means of electrically-operated lifts, supplied by the Easton Lift Company, working in large masonry towers erected on each platform.

lift towers are ornate in design and constructed with rock-faced quoins, string mouldings, and cornices of Nailsworth stone, with panel walls in hammer-dressed, coursed rubble work of Westleigh limestone.

Signalling is mechanical, installed in accordance with the present "Reading" standards. Great Western down trains are controlled for entering the station by a four-doll gantry with arms: down main to through, main platform, middle platform and bay lines, with distants and calling-on arms to the former. To control the scissors crossing between

Photo.] THE NEW ISLAND PLATFORM. [*G.W.R.*

There are two openings to the lift tower on each of the island platforms, a single opening only between the down platform and its tower, and likewise between each tower and the bridge. All the openings to the towers are provided with patent collapsible gates, electrically interlocked with the operating mechanism of the lift in such a manner that no lift can be operated unless all its gates are locked in position across the openings, and no gates can be opened unless the lift is stationary and at the end of its travel. The lifts are of the suspension type, and designed to carry a load of 30 cwt. The

No. 1 and the down through line a five-doll gantry is erected on the middle platform, again with distants for non-crossover routes, and calling-on arms.

Departures at the Great Western "west" end are governed by a gantry spanning the lines concerned. There are three high dolls respectively, "down through" to London and South Western Railway, to Great Western main, and middle platform to London and South Western Railway. Distants for Nos. 1 and 3 are repeating signals for London and South Western Railway up advance starting signals. On the left-hand support

Digitized by Google

for the gantry is a single arm for No. 1 to the sidings outside the station, largely used when changing engines, while, suspended under the gantry, are the down main platform and middle platform starting signals, both with calling-on arms. The somewhat peculiar distribution of the respective arms is due to sighting considerations.

Approaching up Great Western trains meet a three-doll gantry with arms applying respectively to the three roads available, each with distants to signals midway along the station, and calling-on arms below. On a subsidiary bracket is an arm admitting to the through goods line. Spanning the up main, up relief, and up middle platform lines is a gantry controlling train movements along the platforms, with two backing arms suspended from an extension of the gantry for engine movements, including access of London and South Western Railway banking engines to their lie-by spur. Final departures from Nos. 5 and 6 have starters, each with distant below.

On single posts are various other signals, as required, with a generous equipment of shunt arms and disc signals. Signalling is, in fact, very complete and adequate, and, in conjunction with universal track-circuiting, renders this station one of the safest and yet most convenient to work.

Five signal cabins are concerned: East, Middle, West, Goods Yard, and Cowley Junction. The "West" box is placed between the Great Western and London and South Western lines. It has 114 levers, and, in view of the curved approach by London and South Western Railway trains from Queen Street or coming out of the carriage sidings, a buzzer sounds from this box to give warning to members of the staff using the lines. The "Middle" box has 95 levers and controls station shunting at the north (east) end, and also protects the Red Cow Crossing adjacent to the platform. "East" box (45 levers) controls traffic at that end of the station, also governing connections with the goods lines and yards.

Reference to the passenger side, however, by no means represents the full scope of the station. The goods yard is alongside, and traffic working is so much interwoven, while the stationmaster has the direction of both sides, that it is impossible to overlook this portion of the work.

On the down side at the east (north) end is a new yard, intended, and formerly used, for mileage traffic, but at present regarded as generally useful. This also gives access to private sidings, oil stores and depôts, &c. Several of the buildings here date from early days, with turntables and other features. Further east are the east end carriage sidings. At the west end, on the down side, are only the old South Devon carriage sheds, served by a spur off No. 1 line, and separated by the ascending grade of 1 in 37 to Queen Street from the Great Western lines. Otherwise all goods equipment is on the up side.

The goods area is bounded along the banks of the River Exe by the through goods lines which extend from the East to the West box. Although described as "through" lines, they are more correctly arrival and departure lines for goods trains, as most non-stopping goods trains pass through the passenger station. There is urgent need for more accommodation, 59 booked goods trains working into the yard daily and numerous specials, and land further east is already in the possession of the Great Western Railway, on which marshalling sidings will be laid in due course. The average number of wagons put off and picked up daily is between 1,500 and 1,600.

A peculiarity of the lay-out is that, owing to there being no connection between goods yard and London and South Western main line at the south (west) end of station, all goods train transfers with the London and South Western Railway are carried out on the main passenger lines at East Box. The number of wagons exchanged between the Great Western and London and South Western companies averages 6,000 per month.

In the centre of the Red Cow Crossing is the "Middle" Box (95 levers). This stood originally between the up and down passenger lines, and is built upon a narrow structure, the box proper widening above train level. Adjacent is the old Bristol and Exeter tranship shed, now used as a grain store, and the goods mileage office. The main goods shed is on the station side of the crossing, partly alongside the passenger station; but, as men-

Digitized by Google

tioned, two of its roads are included in the main crossing.

Beyond the through goods lines, towards the west end of the station, are the engine sheds, an area for this purpose being provided by a bend of the river. The main shed has four straight roads. The yard leads out past the coal stage and turntable alongside the old atmospheric pumping station, and so across the shunting spur which extends on to the bridge over the river to the running lines. A small signal cabin, adjacent, controls yard shunting outside the limits of the passenger station.

By virtue of its geographical position, traffic at St. David's is necessarily very considerable, and this applies all the year round, though in the summer months it naturally reaches its maximum. A peculiarity is, however, that statistics afford little indication of the real volume of traffic, seeing that so much of it is associated with return and through tickets not originating there.

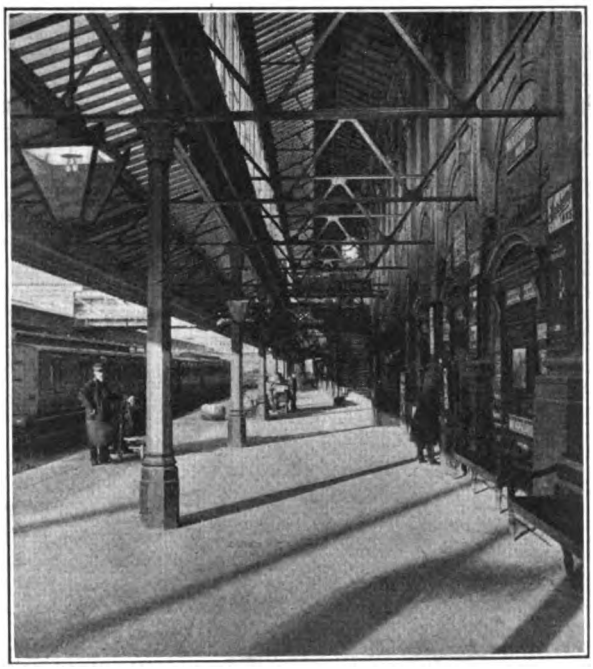


Photo.] DOWN MAIN LINE PLATFORM. [*G.W.R.*

There are also in the season big transfers between Great Western and London and South Western trains. Thus, passengers from Birmingham, the north, and from Bristol, arriving by Great Western trains and through cross-country vehicles, change into London and South Western trains for Bude and Padstow. On the other hand, London and South Western passengers from Salisbury, Southampton, &c., frequently travel via Exeter, there changing for South Devon and Cornwall. This applies largely for traffic not originating in London, and St. David's often has a busy time at periods when trains suitable for such transfers are being dealt with.

Whether arriving by direct trains of either company or involving transfers, the summer traffic is very heavy, not only to Torquay, Great Western Cornish and South Devon resorts, but also to Bude, Padstow, Ilfracombe, Torrington, Bideford, &c., by London and South Western routes. In fact, Torquay, Ilfracombe and Bude are responsible for almost phenomenal numbers of passengers direct or transfer.

Through carriages, involving London and North Western and Midland coaches, as well as Great Western, also a few of other companies, bring passengers in large numbers from Liverpool, Manchester, Crewe, Birmingham, Leeds, Bradford, &c., besides the Cardiff, Newport, Hereford, Gloucester and other routes entirely or partially Great Western. Parcels and mail traffic provides still further complications, through vans travelling much further afield, including one or two Caledonian coaches from and to Glasgow. Fish and other varieties of traffic conveyed by passenger trains are also considerable factors. Excursion traffic was, before the war, a very big item, as many as 30 to 35 regular season excursion trains passing through Exeter on a Friday or Saturday in connection with the special week-end excursions which figured so prominently in Great Western and London and South Western programmes.

Parcel-post work is dealt with in a special depôt erected near the station, but transfer is made by hand. Seeing that in normal times this often involves over 1,000 packages, this is by no means an insignificant factor, while mails amount to some 600 bags daily.

Digitized by Google

Goods traffic in Exeter has no distinctive features. It is rather that of a country town, constituting a distributing centre for a very large area. There is a large

MR. C. A. PATEY,

District Traffic Manager, Exeter, Great Western Railway.

trade in provisions and drapery received in bulk, by firms who supply all the district round.

Among the industries located in Exeter are :—Engineering works, iron foundries, paper and flour mills, soap and candle factory, tannery, gas stove works, English timber, and wool and skins, the latter being collected in Exeter and the district, and, after treatment, sent away for various purposes. There is also a large business done in wines and spirits, the latter being the survival of an old trade established in the days when cargoes were brought to Exeter direct from France, Spain, and Portugal. In normal times the shipping trade of the port includes cargoes of sugar, foreign timber, oil cake, fish, cement, glass, &c., the return cargoes being principally English timber and barytes. The Friday cattle market is one ot the largest in the county.

Principal Great Western passenger trains dealt with at Exeter involve a considerable amount of shunting, there being a number of instances where trains are altered in composition, while several through coaches terminate or start from here. On the down side the centre through road and the South Devon carriage sidings are useful, and it is largely for this reason that a number of engines whose duties take them through either from London to Plymouth (returning the next day), or from Bristol to Plymouth, come off one train at Exeter and take on the next. On arrival an engine runs into the South Devon siding with one or more vehicles, while another backs on with other vehicles to be taken on, after waiting down the line or on the through road. Other vehicles may be attached or detached in rear by a shunting engine. At the up Great Western island, similarly, an arriving train uses one side and vehicles to be attached are placed on the other side, the arriving engine running off and either fetching the coaches to be attached, or being replaced by the engine already on them.

Owing to the opposite character of Great Western and London and South

MR. JOHN LEA,

Stationmaster, St. David's Station, Exeter.

Western Railway up or down trains, the list of trains posted at Exeter is not given on the basis of arrivals and departures, but of direction, stated as "Great

Digitized by Google

Western Railway down trains and London and South Western Railway up trains," or the reverse. Each section involves about 55 trains, and the compilation of these posters may be commended in that they give a very good indication of the character of each train, largely superseding the necessity for consulting timetables.

Principal Great Western services are :—(1) The special London trains and (2) the Bristol and North trains. The former includes the Cornish Riviera expresses, and, although the down train is the only one not booked to stop at St. David's, it must necessarily take the down platform line, owing to the slip coaches for Exeter and Torquay.

As the headquarters for a large division of the Great Western Railway, St. David's has an importance beyond that which it has as a busy traffic centre. Mr. C. A. Patey is now in charge as District Traffic Manager.

Mr. C. A. Patey entered the service of the Bristol and Exeter Railway Company at Bristol in 1874, and removed to Exeter in 1876. After experience in the goods department and district goods manager's office—during ten years of which he was canvasser—he, in 1902, became chief clerk to the district goods manager at Exeter, and, on the retirement of Mr. C. W. Wyatt in December, 1912, Mr. Patey succeeded him as District Goods Manager. In January, 1916, he was promoted to the position of District Goods Manager at Plymouth, and in July, 1919, upon the establishment of a District Traffic Manager at Exeter, Mr. Patey returned from Plymouth to take up the position.

The Exeter District Traffic Manager has responsibilities, so far as the traffic department is concerned, from Durston to Totnes, both stations inclusive, with all intermediate branches, and the goods department working from Weston-super-Mare, Castle Cary and Yeovil exclusive to the same limits at the western end.

Mr. John Lea, stationmaster, has charge of all traffic working in and about the station and goods yards, also at the City Basin goods department. His staff numbers about 170. He entered the Great Western Railway service in the traffic Department at Market Drayton, and, after an all-round experience at various stations and in the Goods Manager's office at Shrewsbury, was promoted to the Chief Goods Manager's office at Paddington. In 1896 he again transferred to the traffic department as Relief Clerk, attached to the London Divisional Superintendent's office, was appointed Stationmaster, Slough, April, 1904, and Exeter, January, 1911. He succeeded Mr. Williams, stationmaster at the time of Mr. Arthurton's article, previously referred to. It is interesting to note that from April, 1851, until April, 1891, Mr. W. Mears was in charge at Exeter. Surely a record period for such a post! Mr. S. Morris, brother of Mr. J. Morris, the well-known former Superintendent of the Line, occupied the position between Mr. Mears' retirement and the appointment of Mr. Williams.

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. L. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (All out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Both out of print.)
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)
NORTH EASTERN: Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (All out of print.)
SOUTH EASTERN: June, July, Aug., 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918. (Jan. out of print.)
CALEDONIAN: March, April, May, June, 1918.
LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)
MIDLAND: May, June, July, Aug., Sept., Oct., Nov., Dec., 1919. Jan., Feb., March, 1920.

All parts still in print are One Shilling each.

In "Railway Magazine," April, 1920, Mr. Ahrons commenced a series of articles on the North British Railway.

Digitized by Google

Locomotive and Train Working in the latter part of the 19th Century

NORTH BRITISH RAILWAY. [No. III.]

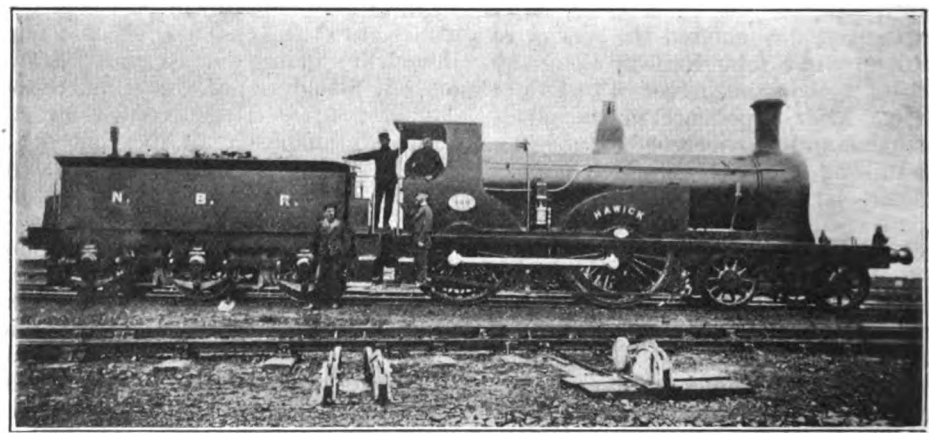
By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

I HAVE mentioned that in one respect Mr. Drummond did not follow Mr. Stroudley's practice, since he introduced leading bogies, whereas Mr. Stroudley never at any time built an engine with a bogie. The result was that Mr. Drummond adopted the 4-4-0 type for all his express engines, whereas Mr. Stroudley made a bold move and adopted the 0-4-2 type with large leading coupled wheels. It may be remarked that in following Mr. Stroudley's Brighton practice Mr. Drummond confined himself only to those types which had been designed and built whilst the latter was works manager at Brighton, and the 0-4-2 express engines of the "Richmond" and "Gladstone" classes were of a later date. Had Mr. Drummond remained a few years longer at Brighton, one may wonder whether he, too, would have found so much to admire in the 0-4-2 express engine as to build engines of that type.

There was, however, another and cogent reason for the adoption of leading bogies for the new North British express engines. These were intended for the hard and sinuous Waverley route, on which the curves are numerous and severe, and the speeds at which the day and night Pullman expresses to and from the Midland line had to be run were much higher than anything that had ever before been attempted on this road. Four of the new 4-4-0 engines, Nos. 476 to 479, were built by Neilson & Co. in 1876, and the same firm also built Nos. 486 to 489 of the same class in 1878, whilst during the latter year Nos. 490 to 493 were constructed by the North British Railway at Cowlairs. The engines were named as follows :—

476	*Carlisle.*	488	*Galashiels.*
477	*Edinburgh.*	489	*Hawick.*
478	*Melrose.*	490	*St. Boswell's.*
479	*Abbotsford.*	491	*Dalhousie.*
486	*Aberdeen.*	492	*Newcastleton.*
487	*Montrose.*	493	*Netherby.*

All the names, except those of Nos. 486 and 487, are connected with the Waverley



4-4-0 ENGINE, No. 489, "HAWICK" (CLASS 476-479 & 486-493).

Designed by Mr. D. Drummond and built by Neilson & Co. in 1876-1878. Coupled wheels, 6 ft. 6 in. diam. Cylinders, 18 in. by 26 in.

Digitized by Google

route, over which these engines ran for many years. Engines Nos. 486 and 487, however, when new, were put to work between Dundee and Aberdeen after the opening of the Tay Bridge, and, consequently, received names connected with that section of the line. I believe that one of them was stationed at each end. After the fall of the Tay Bridge in December, 1879, the working between Dundee and Aberdeen was completely altered to suit the resulting conditions, and the two engines were removed to the Waverley route. Consequently, in accordance with Mr. Drummond's system of engine nomenclature, they were renamed, and No. 486 became *Eskbank* and No. 487 *Waverley*. No. 493, *Netherby*, formed one of the procession of engines to Wylam on the occasion of the Stephenson Centenary in 1881.

The twelve 4-4-0 engines of the "476" class had 6 ft. 6 in. coupled wheels, 18 in. by 26 in. cylinders, and 140 lb. pressure. The wheelbase was 22 ft. and the coupling-rod centres were 9 ft apart, a length which was greater than that of any other engines of that day. The boiler was of the large diameter, for that time, of 4 ft. 5⅛ in., and had a tube heating surface of 1,005·3 sq. ft., to which the firebox added 94 sq. ft., making a total of 1,099·3 sq. ft. The grate was a large one, and had an area of 21 sq. ft. The total weight of engine No. 493 in working order was 46 tons 2 cwt., of which 30 tons 8 cwt. were available for adhesion.

The "476" class were stationed at Carlisle and Edinburgh, and for more than 20 years worked the Scotch expresses of the Midland Railway over the Waverley route. The Edinburgh engines sometimes worked to Glasgow, and over other sections of the North British line. A curious mishap occurred to No. 476 when working one of the expresses between Carlisle and Edinburgh. The sand-boxes of these and all other North British express engines were formed by means of an extension of the driving splashers, the tops being slightly raised above the latter. During a heavy gale the wind seems to have got underneath and lifted the sand-box lid, detached it from its fastening, and blew it through the cab window, severely injuring the driver. I am not sure whether the lid was attached to the sand-box by means of a chain on this particular engine, but it is the usual practice to secure them in this way.

The opening of the Midland route to Carlisle produced a big alteration in the train services and speeds over the Waverley route, and it was well that the "476" class came into being to tackle the trains, for, before their advent, there were certainly no engines on the North British which were capable of doing the work required. In August, 1876, a few months after the new service had been inaugurated, the fastest down train was the 6.22 p.m. from Carlisle (10.30 a.m. from St. Pancras). This train conveyed a twelve-wheeled Pullman and one twelve-wheeled Midland clerestory-roof bogie coach, in addition to six-wheeled coaches from London, Bristol, Leeds, Bradford, &c. It was due at Edinburgh at 8.55 p.m., and made four stops on the journey from Carlisle. The best run was from Carlisle to Hawick, which was timed in 64 min. for the 45½ miles, of which the first 34 miles are heavy pulling, the last 8 miles being on the 1 in 75 bank up to the summit beyond Riccarton Junction.* The night train left Carlisle at 5.0 a.m. and reached Edinburgh (98¼ miles) in 2 hours 35 min., with three stops. Pullman sleeping cars were attached to this train, which was also heavy, as it conveyed through carriages from various parts of the Midland system. The time allowance from Carlisle to Hawick was 68 min. The best up train left Edinburgh at 10.30 a.m., and reached Carlisle at 1.5 p.m., with three stops, of which Galashiels (33½ miles) was reached in 52 min. from Edinburgh. This section includes the severe 8-mile climb of 1 in 70 to the Falahill Summit. I think it may be truthfully stated that there was no locomotive work in the kingdom at that period that was better than the North British performances over the severe gradients of the Waverley route. And in 1881 still better work was being done. The 10.30 p.m. up night Scotch express from Edinburgh and the corresponding 3.37 a.m. down from Carlisle both ran from end to end without stopping in 2 hours 20 min., at an average speed of 42 m.p.h. For very many years

* With the heavier trains a stop was generally made at Newcastleton to take a bank engine.

Digitized by Google

this timing remained the high-water mark of North British speed over the Waverley route for those trains which ran between Edinburgh and Carlisle without stopping.

When the "476" class, and also the two 7 ft. singles, first came out, they were provided with an arrangement for heating the feed water in the tender tank, very similar to that used on the Brighton Railway, and pumps were used for supplying the boiler. After having been in use for some time the arrangement was discarded, as it was found inconvenient to use pumps, and the cost of fitting up the apparatus and keeping the crosshead pumps in repair more than outweighed the advantages obtained.

With one of the "476" class and a load of about 110 tons, I have a record in which, after starting dead from Newcastleton, Shankend ($14\frac{1}{8}$ miles) was passed in 25 min. 48 sec., the average speed being 32·8 m.p.h., including the $9\frac{1}{2}$-mile steep bank, 8 of which rise at 1 in 75. Thence the 7 miles to passing Hawick were covered in 7 min. 22 sec., the fall being mostly at 1 in 75 to 1 in 100. From Hawick the undulating 19 miles 24 chains to Galashiels took 23 min. 25 sec., and was followed by an excellent climb over the Falahill, $17\frac{1}{2}$ miles being covered in 23 min. 35 sec., or at the rate of 44 m.p.h., the last $1\frac{1}{2}$ miles being downhill. The descent to Portobello, where the train was stopped, was taken very easily, and the 71-mile run from Newcastleton was made in $95\frac{1}{4}$ min. exactly, or at a running average of $44\frac{3}{4}$ m.p.h. On another occasion, with a similar load, the down night tourist express ran from Carlisle to a stop at Portobello, $95\frac{1}{4}$ miles, in 2 hours 10 min., nearly 44 m.p.h.

The opening of the Midland route spurred the East Coast to the extent of a reduction of half an hour from the timing of the 10.0 a.m. "Flying Scotchman" from King's Cross, which in 1876 arrived at Edinburgh at 7.0 p.m., and left at 7.10 p.m. for Glasgow, worked by one of the two 7 ft. singles. Both this train and the 9.10 p.m. from Edinburgh took 70 min. to Glasgow, with two stops, but a year or two later the 9.10 p.m. was given 5 min. longer for the journey, with an additional stop. All the express trains from Glasgow to Edinburgh were allowed $1\frac{1}{4}$ hours. Of these there was one in 1876, but in 1881 the number had been increased to three. The fastest running on the North British was done over the Edinburgh and Glasgow section. Both the 7.10 p.m. and the 9.10 p.m. from Edin-

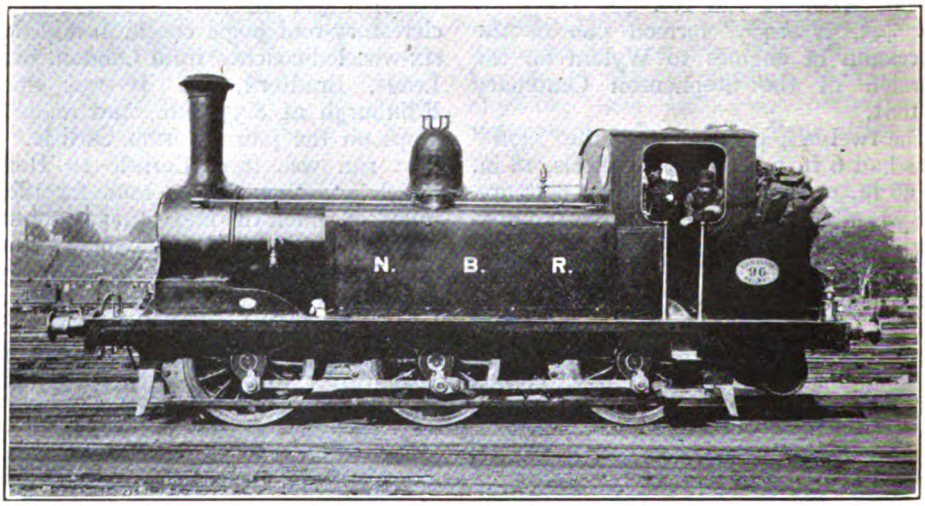


Photo.] [*Loco. Publishing Co., Ltd.*

6-COUPLED PASSENGER TANK ENGINE, No. 96.

Designed by Mr. D. Drummond and built at Cowlairs, 1875–8. Wheels, 4 ft. 6 in. diam. Cylinders, 15 in. by 22 in.

Digitized by Google

burgh ran from Polmont to Cowlairs (23½ miles) in 29 min., at a booked speed of 48·6 m.p.h.

The inauguration of the Midland Scotch express service caused the North British, after conducting its own trials, to adopt the Westinghouse brake over the Waverley route, for at that time the Midland through Scotch trains were all fitted with this brake. The first North British engine so fitted was No. 421, one of Mr. Wheatley's earlier bogie engines. This engine ran between Edinburgh and Carlisle for a short time until the "476" class were ready, the latter being Westinghouse fitted when put to work in 1876.

For passenger traffic Mr. Drummond designed four different classes of tank engines, the first two of which were obviously derived from Mr. Stroudley's Brighton practice. The first of these classes consisted of 25 0-6-0 "Terrier" side-tank engines on very similar lines to those of the Brighton Railway, but of somewhat larger dimensions. They were all built at Cowlairs between 1875 and 1878, and, like their Brighton cousins, were named after various stations on the railway, the names in many cases indicating the branches and districts over which the engines worked. The following is the list of these engines :—

20	*Haddington.*	162	*Loch Leven.*
22	*Langholm.*	165	*Boness.*
29	*Granton.*	166	*Bothwell.**
49	*Gretna.*	240	*Polton.*
96	*Arbroath.*	241	*Bervie.*
97	*Bonnington.*	259	*Queensferry.*
106	*Tayport.*	274	*Dalkeith.*
107	*Leuchars.*	284	*Grahamston.*
108	*St. Andrews.*	295	*Bellgrove.**
123	*Westfield.*	297	*Leith.*
151	*Guardbridge.*	313	*Musselburgh.*
158	*North Berwick.*	485	*Blairadam.*
161	*Buckhaven.*		

The above engines had 4 ft. 6 in. coupled wheels, cylinders 15 in. by 22 in., and 140 lb. pressure. The total heating surface was 701 sq. ft., and the weight in working order 35½ tons. One peculiarity, as they were originally constructed, was that the cylinders had four valve faces, due to the use of double exhaust ports, one at each end of each cylinder, but these cylinders were afterwards taken out and replaced by others of the usual design. Some of the 1875 engines of the class were fitted with pipes for conducting the exhaust steam to the side tanks.

A large number of these engines were to be found in the Edinburgh district on the Leith and Granton branches. Nos. 108 and 151 worked the St. Andrews branch from Leuchars Junction, as evidenced from their names. Nos. 96 and 241 were in the Arbroath district, and Nos. 106 and 107 were at Dundee. As in the case of all Mr. Drummond's engines, Mr. Holmes removed the names from them very shortly after he took charge of the locomotive department. The Stroudley system of topographical nomenclature for locomotives evidently did not appeal to him.

Mr. Drummond's second class of passenger tank engines, built in 1877, consisted of six 0-4-2 engines, which were so very like the Brighton "D" class that they might at first glance have been taken for products of Brighton instead of Cowlairs works. They differed somewhat in dimensions, the coupled wheels being 5 ft. 9 in. and the single pair of trailing wheels 4 ft. 6 in. in diameter. The cylinders were 17 in. by 24 in. and the pressure 140 lb. The total heating surface was 1,075 sq. ft. and the weight in working order about 48 tons, of which 17 tons were carried on the trailing wheels, but this weight proved to be too heavy, and, after they had been at work for some time, Mr. Drummond altered them by substituting trailing bogies and lengthening the footplates and coal bunkers. Some of these engines worked for a time on the Glasgow and Helensburgh road, but they were shortly afterwards transferred to the Fife district to work the trains between Dundee and Burntisland over the old Tay Bridge, and, when so transferred, the names of some of them were, of course, changed to suit their new geographical surroundings. These engines were :—

88 *Kirkcaldy* (originally *Helensburgh*).
89 *Ladybank* (originally *Gareloch*).
157 *Markinch* (originally *Dumbarton*).
167 *Dundee.*
314 *Lochee.*
480 *Burntisland.*

After the fall of the old Tay Bridge they continued to work between Tayport and Burntisland until the opening of the new bridge, when they left the district.

The third class consisted of only three large tank engines of the 4-4-0 type, with

* In 1881-2 the name of No. 166 was changed to *Newport*, and that of No. 295 to *Carnoustie*.

Digitized by Google

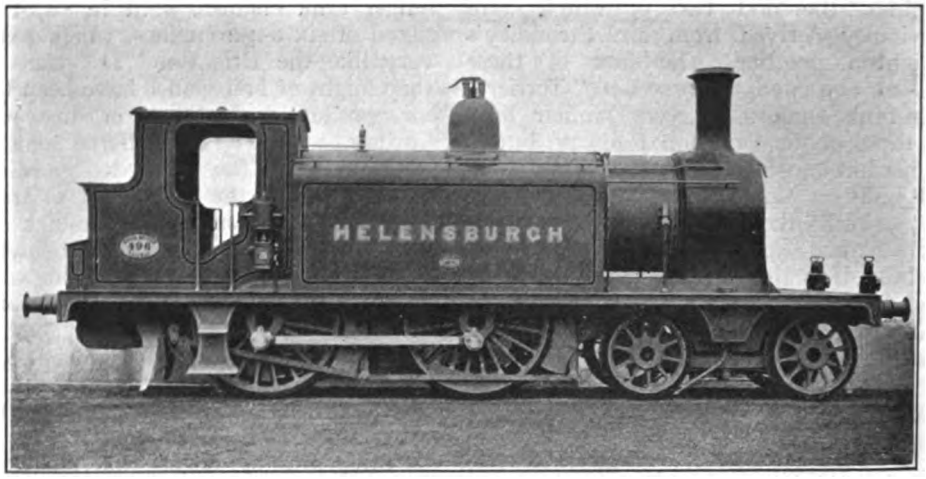
leading bogies, and in designing these engines Mr. Drummond broke away from the Stroudley tradition. They were constructed by Neilson & Co. in 1879 for the heavy traffic between Glasgow and Helensburgh, and had coupled wheels of the large diameter of 6 ft., this being at that time the largest size of wheels for tank engines in the country except those of the London, Tilbury and Southend Railway. The new engines were :—

494 *Craigendoran.*
495 *Roseneath.*
496 *Helensburgh.*

The bogie wheels were 3 ft. 6 in. in diameter, and the cylinders were 17 in. by 26 in. The total heating surface was 1,174 sq. ft. and the grate area 17½ sq. ft. In working order the engines weighed 46 tons 16 cwt., of which 32 tons 6 cwt. were available for adhesion.

On page 227 of the April number I ventured the opinion that some of the North British trains of 45 years ago might, as far as speed was concerned, have been put under the charge of a 'bus horse. It did not occur to me, at the time I wrote this, that there actually was a North British passenger train service worked by a horse. These trains ran for over 50 years until as recently as 1914, when the horse gave way to a locomotive. The horse—or, rather, I ought, perhaps, to say, horses—were not numbered with the company's locomotive stock, though they probably had names.

Mr. Cecil J. Allen does not appear to have dealt with this service in his articles on "British Locomotive Practice and Performance," which seems somewhat of a pity. The trains were those on the Port Carlisle branch, 2½ miles long, which makes a junction with the Carlisle and Silloth line at Drumburgh Junction, and the system of horse haulage dated back to 1856, before the North British took over the line. They consisted of one small narrow four-wheeled coach or "dandy," and, of course, being respectably connected trains, duly scheduled in the timetables, ran on rails laid to the standard 4 ft. 8½ in. gauge. The branch line in question is situated on the English side of the border, so that it must be admitted on behalf of the North British authorities that they reserved the horse for the "Southron," for whom they probably considered it quite good enough. Nevertheless, Scotland cannot claim a clean bill of health in this respect, for there is, or was more recently than 1914, a similar branch line on the Caledonian Railway worked by the same method, and may be so now unless, perchance, the old horse has died from Government control.



4-4-0 TANK ENGINE, No. 496, "HELENSBURGH" (CLASS 494-496).

Designed by Mr. D. Drummond and built by Neilson & Co., 1879. Coupled wheels, 6 ft. diam. Cylinders, 17 in. by 26 in.

(To be continued.)

Digitized by Google

Speed Signalling on the Victorian Government Railways.

A NOTABLE EXAMPLE OF AUTOMATIC, "SPEED" AND SPECIAL THREE-POSITION SIGNALLING.

STANDARD signalling practice necessarily includes certain speed aspects, in that an adverse "distant" gives a warning to reduce speed for traffic reasons, a fixed "distant" supplies a corresponding instruction of a permanent nature, and the relative heights and locations of semaphores in signal combinations convey the implication that diverging or inferior routes call for cautious running. But these aspects are mainly incidental, whereas speed signalling places greater stress upon the display of signals for the purpose of controlling speed than upon the completeness of information given as to the setting of routes at junctions. The principal ground for advocating the speed system of signalling is that ordinary practice depends mainly upon drivers' knowledge of speed orders in force at specific places, and ordinarily it is only by implication that a reduce-speed injunction is conveyed, whereas it is not so important to inform a driver as to details of route set for him as to ensure that speed is always maintained at a safe rate.

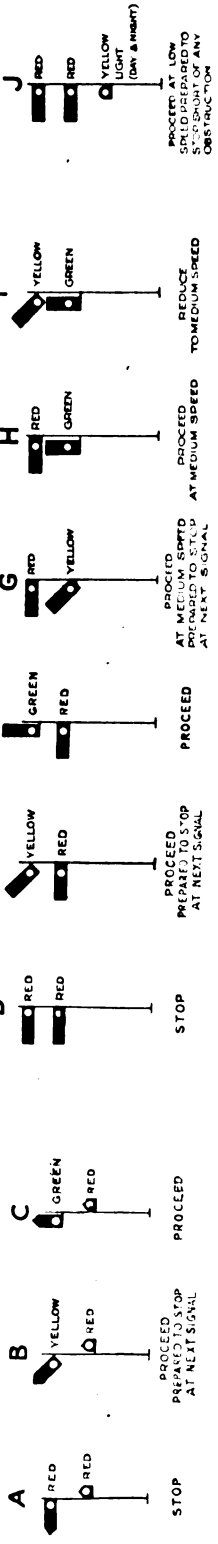
Signalling on speed lines has, therefore, been receiving attention for some years past, and in certain countries has already been developed to some extent. In view of this, Mr. F. M. Calcutt, Engineer for Signals to the Victorian Government Railways, made very full investigations concerning advanced signal practice in various countries, and in conjunction with the electrification of the Melbourne suburban lines—described in the March RAILWAY MAGAZINE—power and automatic signalling with speed aspects is now being installed.

Operation is electric, with track circuit control, and using the three-position upper-quadrant system, but in every case running signals have two lights, and frequently two arms. Signals of an automatic character have pointed ends, and, when necessary, may be passed at "danger" after coming to a stand for a specified period, then proceeding under full control. This practice, which is generally permitted with automatic signals, avoids a complete hold-up of traffic in the event of a signal failure. In order to differentiate these signals at night, a "marker" light is placed at a lower level and on the other side of the post, so that the two lights appear "staggered." The "marker" light always shows red, so that, in the event of the signal lamp proper being extinguished, a definite "stop" indication is given.

Signals which are under manual control, principally where points and crossings are concerned, also have two lights, and these are placed in the same vertical line. The arms of interlocked signals are square-ended. Where only one arm is required the lower light is a permanent red marker, as in the case of automatic signals, but usually two arms are required for junction purposes, in which case the lamp for the second arm provides the lower light. In such cases the upper arm inferentially applies to the main or high-speed route, while the lower covers the branching routes, whether one or several; but such applications are not exact, as the indications given are more correctly as to speed permissible, and for certain purposes both arms are utilised. As a rule the high-speed route is the main one, and the high-speed indications maintain the lower arm in the horizontal position, while the low-speed routes are covered by the movements of the lower arm, but when conditions do not accord with this differentiation speed aspects supersede those of traffic importance.

At this stage reference may be made to the diagrams reproduced on the next page. A. B and C cover the standard indications of automatic

Digitized by Google



STANDARD INDICATIONS, AUTOMATIC AND "SPEED" SIGNALLING, VICTORIAN GOVERNMENT RAILWAYS.

A, B and C—Automatic three-position signals. D, E, F, G, H and I—Interlocked signals giving "speed" indications. J—Special "low-speed" short-range signal.

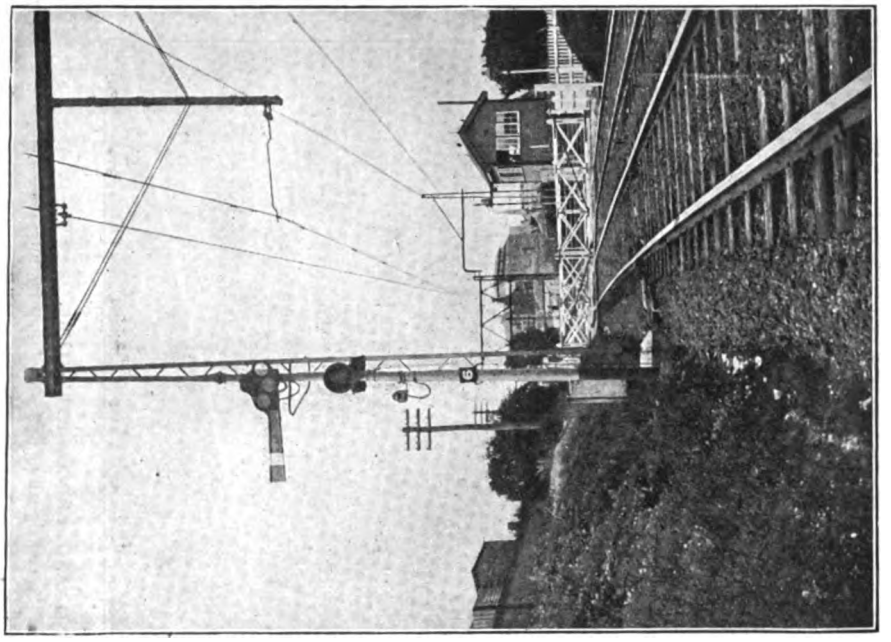
signals, which accord with usual upper-quadrant three-position practice, showing also the "staggered" marker lights. Other signals apply to interlocked plants. If there is only a single arm the lower arm shown in D, E and F is dispensed with, though the light is maintained to show permanently red. In some instances signals of this class have been adapted for automatic working when conditions are suitable. An illuminated letter "A" is then placed on the post as shown on the opposite page, but the marker light remains in the "non-automatic" position.

As a rule, however, there are two arms as shown in the remaining diagrams. D is a definite stop signal against all movements; E indicates "proceed, prepared to stop at next signal," for the high-speed route; and F shows the high-speed route clear for two sections ahead. G and H correspond with E and F, except that the use of the lower arm calls for reduced speed to a diverging route, whether such routes number one only, or two or more. It is argued that with speed signalling it is not necessary to indicate which route of several is set, providing that the required speed reduction for junction purposes is ensured, and this policy gives distinct economies in the number of arms exhibited, besides simplifying a driver's responsibility for picking out signals which apply to him from elaborate combinations.

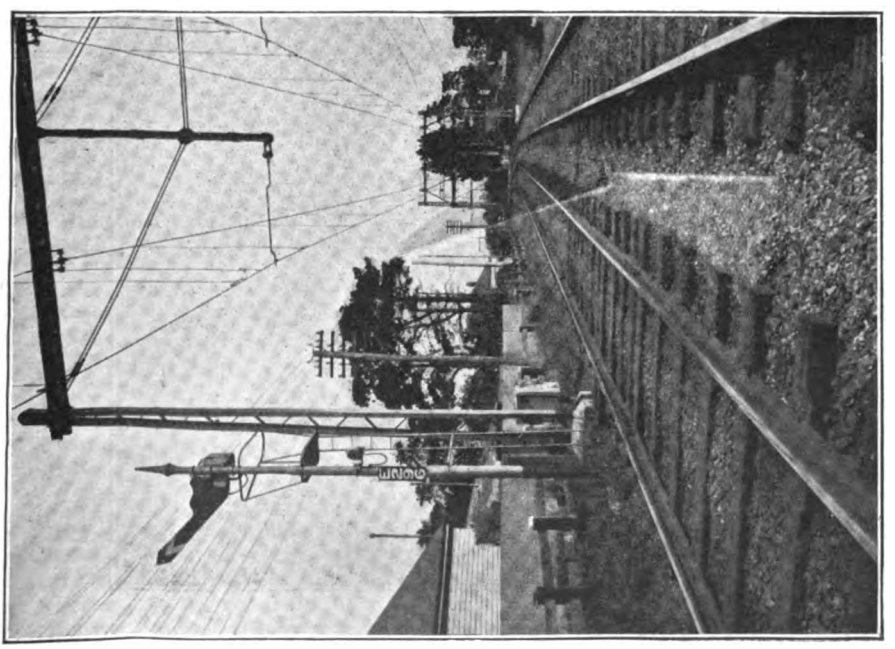
So far the standard indications agree with the classification of the upper arm as applying to the normal and high-speed route, and the lower to any or all divergencies; but I utilises both arms to convey a distinct "reduce-speed" warning, generally used to indicate that a driver is approaching a medium-speed signal. It may be considered as a distant to H, but would also apply where a permanent speed reduction is in force, or where it is desired to give the medium speed warning in advance of a single interlocked arm.

Where automatic signals precede interlocked, the former are sometimes provided with a second arm (pointed), with the same applications as for square-ended semaphores, except that the lower light, replacing the permanently red marker light, is staggered with reference to the upper light.

Digitized by Google



Interlocked square-ended signal, showing marker light directly below, and illuminated letter "A" indicating when the signal is operating automatically.



Automatic signal, with pointed arm, showing "staggered" marker light, for night differentiation from non-automatic signals.

TYPES OF SINGLE-ARM THREE-POSITION SIGNALS.

Digitized by Google

COMBINED ELECTRIC CONDUCTOR-SUPPORTING AND SIGNAL STRUCTURE.

NOTE.—Facing signals are all of double-armed mechanical three-position type on "speed signalling" basis. Opposing direction signals are "three-position automatic."

Digitized by Google

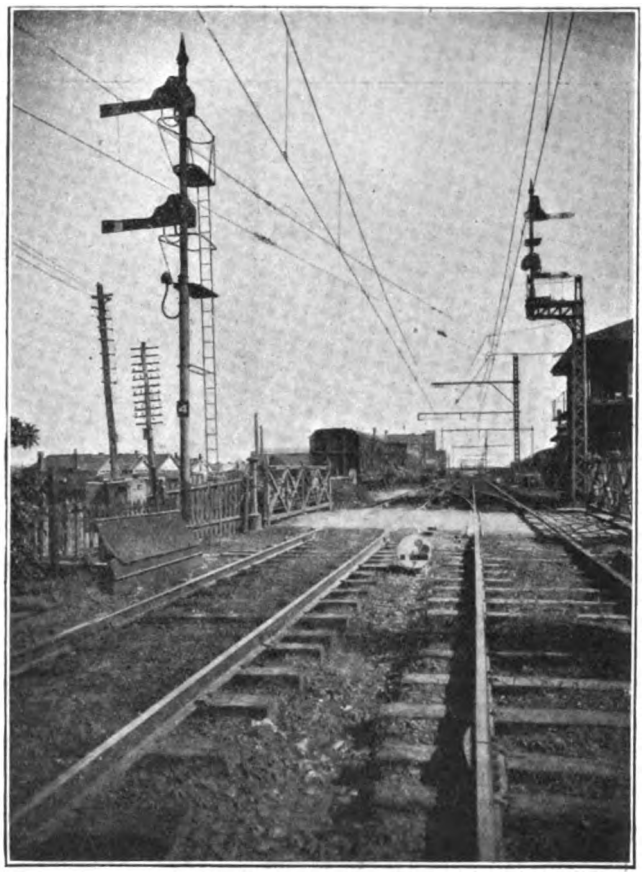
Besides these signals a further one is sometimes employed, as in J. This is used to cover access to sidings, or as a "calling-on" signal, but is shown only when required. By day or night permission to proceed, "prepared to stop short of any obstruction," is given by a yellow light from a hooded lamp designed only for short-range observation.

The low-speed signal can also be used as a calling-on arm, as it is not, like the normal and medium-speed signals, controlled by the track circuits. Thus, when trains must follow each other at a closer spacing than the ordinary signals allow, their movements can be controlled. To give such a signal for a route normally governed by a signal arm the signalman must, in addition to actuating the lever, press a push-button. Although low-speed signals are not controlled by track circuits, their operation detects any facing points they lead over.

In suitable locations hooded lamp signals are used for running purposes, with lamps for the three-colour indications, but application is the same, the marker light being provided in addition as required. For shunting and siding purposes dwarf signals, being a white disc on which is painted a semaphore arm, are used. These have three-colour spectacles, but, to avoid multiplication of red lights about busy station yards, purple is used instead of red, in conjunction with yellow and green. Similar signals giving two indications only are used where suitable.

Occasionally it is necessary to provide a "repeater" signal, as distinct from one corresponding to a "distant." In that case only is the familiar "fishtail" employed, indications corresponding to those of the signal repeated being given, except that the marker light is yellow instead of red. Such signals are used at the approaches to automatically signalled sections, in order to advise drivers as to the condition of the first automatic signal he will reach. It has two indications only —the "caution" and the "clear.

In new cabins and in older ones as it becomes practicable to adopt them, the signals are operated by miniature levers, and with the application of power for point operation, progress with which is being made, power levers also will be similarly operated. Whilst all facing points are mechanically plunged, both the switches, also the plunger, are electrically



REPRESENTATIVE SIGNALS OF VARIOUS TYPES.

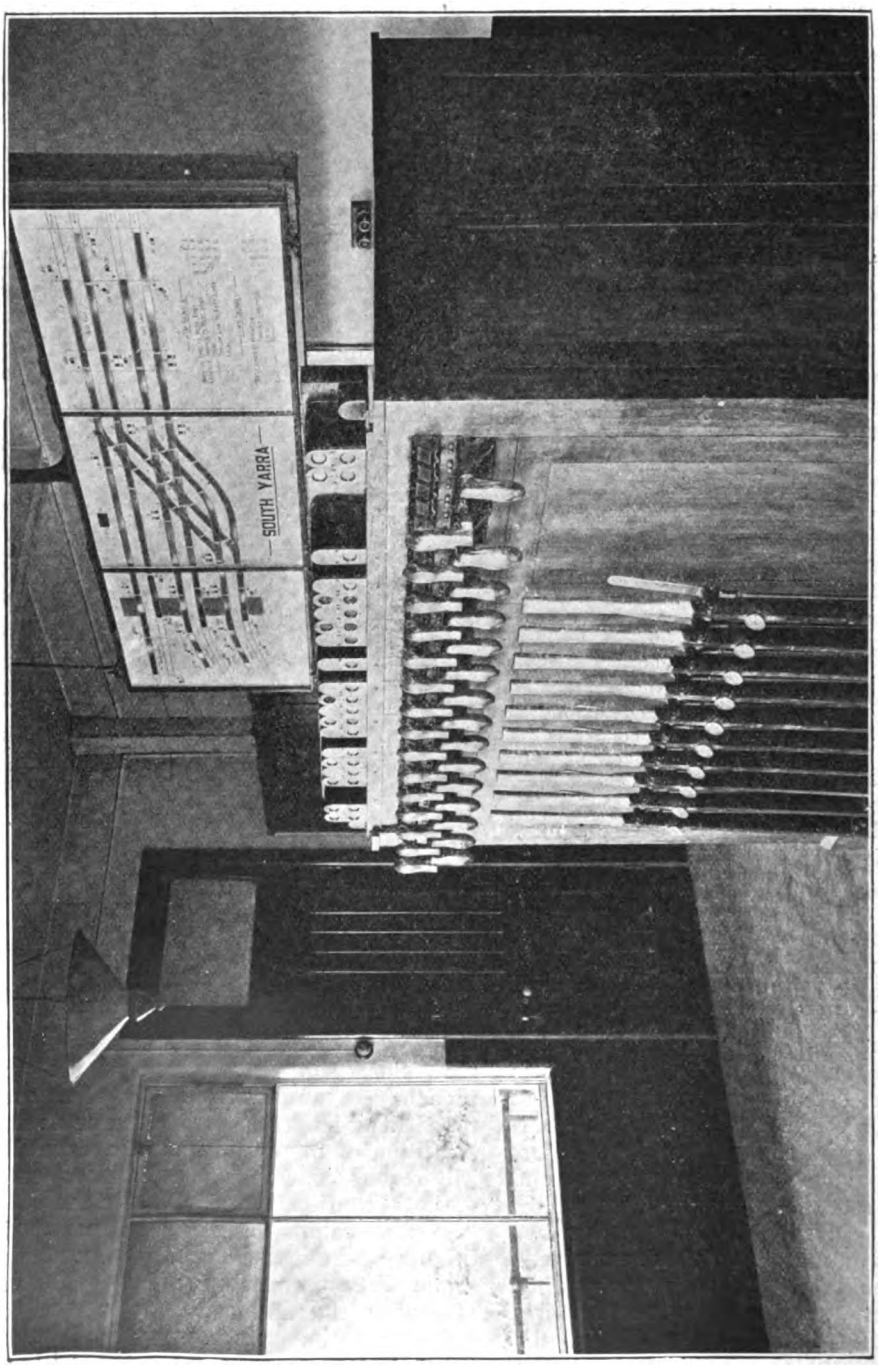
Facing.

(*a*) Double-armed interlocked "speed" signals.
(*b*) Low-speed short-range siding signal below.
(*c*) Two-position dwarf signal.

Opposing.

(*d*) Double-armed automatic signals, showing "staggered" position of lower light.

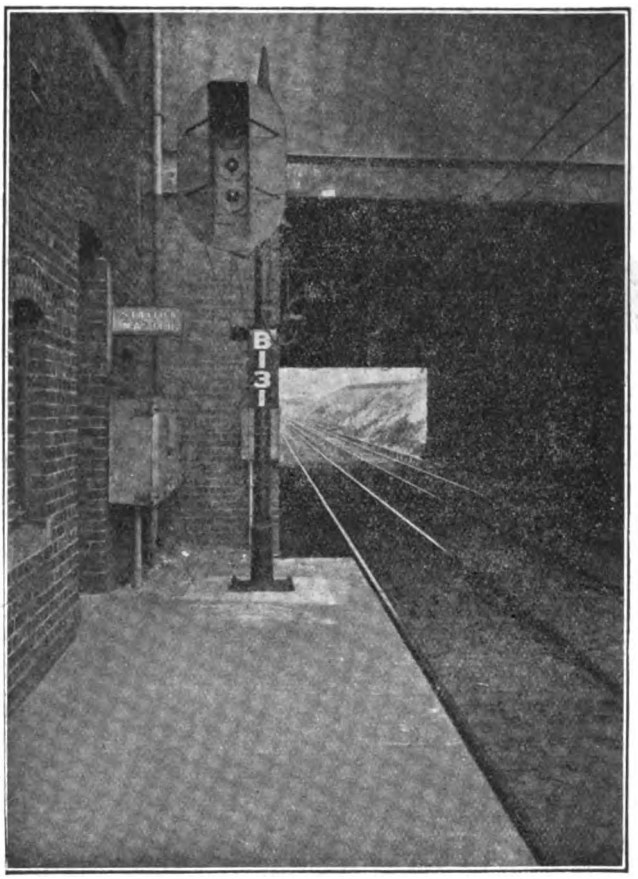
Digitized by Google



ELECTRO-MECHANICAL FRAME, SOUTH YARRA BOX.
Power levers operate signals, points actuated mechanically. Showing also illuminated diagram.

Digitized by Google

detected by apparatus designed and patented by Messrs. Hudd and Wion, of the Signal Department of the Administration. So far, however, only a few cabins have power levers for signals, and, as a temporary measure, most of them retain the old levers minus the mechanical connections, but fitted to make or break the required electrical contacts. Illuminated diagrams are also installed, and the resultant economy in space is well shown by the view of South Yarra cabin interior, although this retains mechanical point levers and governs the traffic of six tracks, as can be seen from the diagram. Each signal lever gives two indications by means of lever lights fixed over the levers on the instrument shelf. These indicate by a red light when the arm is at "danger" and by a green light when the arm is at "clear."



AUTOMATIC THREE-POSITION LIGHT SIGNALS.

Showing "staggered" marker light and identification letters and numerals.

Signal posts are numbered, certain prefix letters being used for automatic signals, according to the line they control. The numbering is taken from zero at Flinders Street, and is given in the hundreds of feet from that zero; thus E 212 is 21,200 ft. from Flinders Street zero on the Essendon line. Home signals bear the lever number. When two or more signals on separate posts are controlled by the same lever, prefix letters U, V, Y, are used.

Between Elsternwick and Essendon there are 13 signal-boxes, with locking frames containing from 25 levers at Windsor to 65 at Flinders Street E box. The latter box used to have a frame of 116 levers, but the smaller frame sufficed when the signals were power-operated. There are four other cabins in Flinders Street yard which contain 58, 144, 180 and 280 levers respectively. These, at present, are only partially equipped with power-operated signals, as it is probable the yard will be power-signalled from two boxes instead of the four mechanical.

All running signals are fitted with train-stop appliances designed to meet the conditions of heavy traffic operation and possible impact at considerable speed.

A special feature also provided in places is a "time-release" mechanism, to allow a signalman to release signal levers in the event of cancellation or change of road while a train is approaching. Its operation sets the affected signals to danger, but no alteration can be made in the route until a certain predetermined time has expired. This ensures changes only being made by the signalman with great deliberation.

Digitized by Google

Banking Trains on the Lickey Incline, Midland Railway.

By CHAS. S. LAKE, A.M.I.Mech.E.

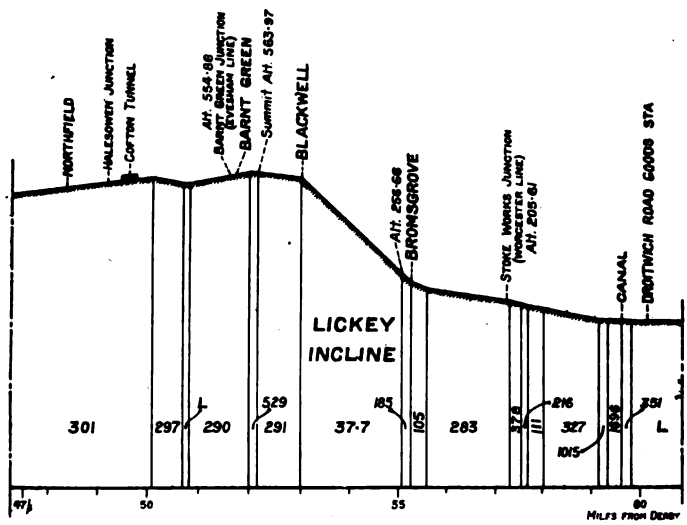
READERS of the RAILWAY MAGAZINE have already had the advantage of making themselves acquainted with the history of the Midland Railway's West of England line and the working of trains between Bristol, Gloucester and Birmingham, which involves, in the up direction, the ascent of the famous Lickey Incline, details of which were given as long ago as 1904 in an article on the subject by Mr. T. R. Perkins and other articles by Messrs. Herbert Rake and J. F. Gairns.

The subject has a renewed interest at the present time owing to the introduction of the heavy 0-10-0 type four-cylinder superheated locomotive built at Derby Works to the designs of Sir Henry Fowler, K.B.E., Chief Mechanical Engineer, and illustrated as frontispiece to the April RAILWAY MAGAZINE.

The writer was provided recently with facilities for noting the work of the trains under present-day conditions on the Incline, and for taking photographs showing the new locomotive, No. 2290, and the tank engines hitherto used, banking both passenger and goods trains on the gradient of 1 in 37·7.

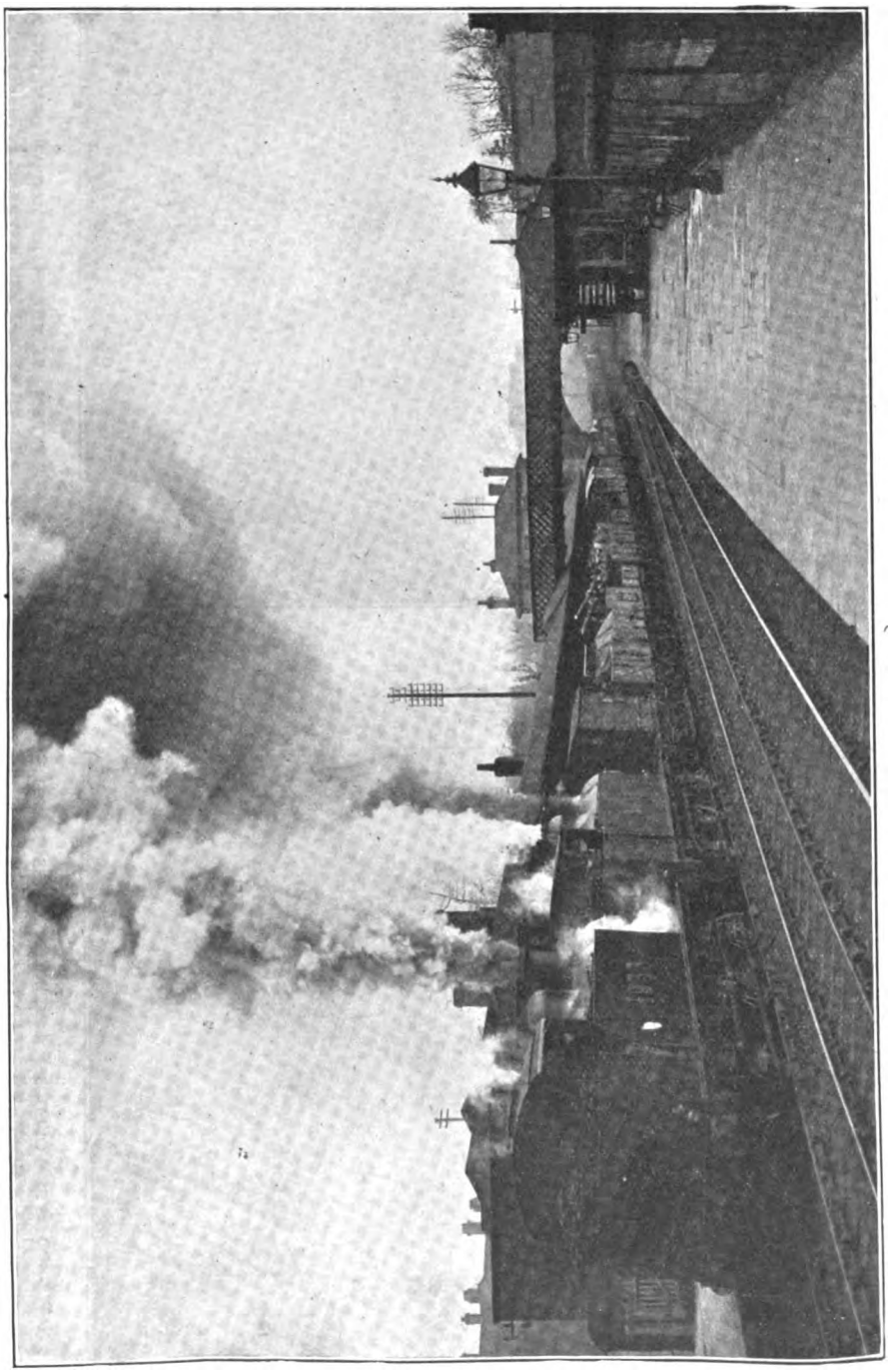
The Lickey Incline, as previous writers have pointed out, formed a bone of contention among the original promoters of the line in 1832 or thereabouts, it being urged by some that the railway should be carried further eastward through another point in the chain of the Lickey hills, where a gradient as easy as 1 in 300 might have been obtained. It was, however, deemed inadvisable to take the line so far from Worcester, and thus in the end the original route was adopted and the ascent of the famous Incline involved.

Such eminent engineers as Stephenson and Brunel contended that the traffic could not be worked by locomotives in the ordinary way on the Incline, and presumably they had in mind the alternative of cable haulage. However, the engineer



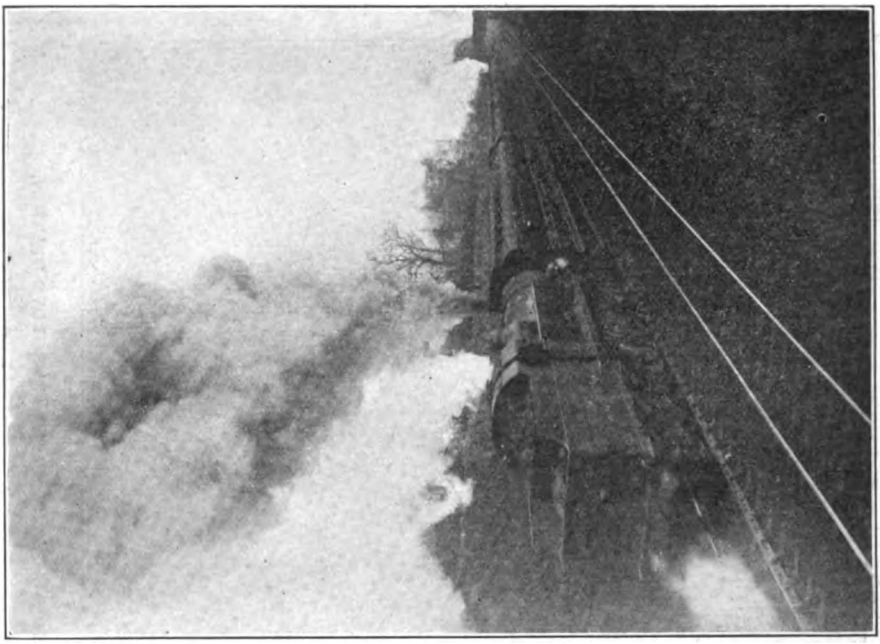
GRADIENT PROFILE SHOWING MIDLAND RAILWAY MAIN LINE BETWEEN NORTHFIELD AND DROITWICH, AND INCLUDING THE LICKEY INCLINE.

Digitized by Google

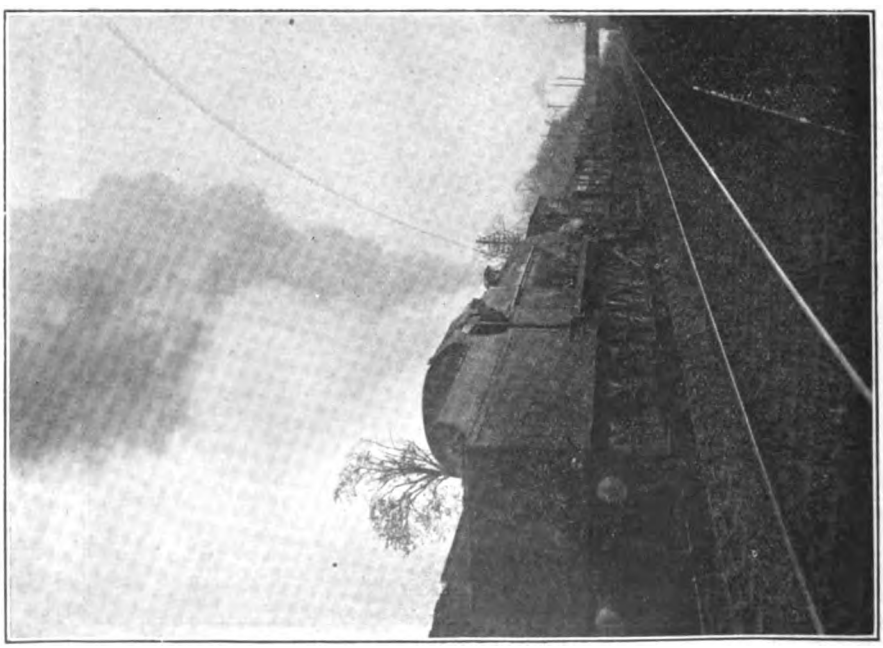


TWO 0-6-0 TANK LOCOMOTIVES ASSISTING A HEAVY FREIGHT TRAIN THROUGH BROMSGROVE STATION.

Digitized by Google



NEW 0-10-0 TYPE 4-CYLINDER LOCOMOTIVE BANKING A BRISTOL-YORK EXPRESS.



NEW 0-10-0 TYPE 4-CYLINDER LOCOMOTIVE ASSISTING A HEAVY FREIGHT TRAIN.

Digitized by Google

for the Gloucester and Birmingham Railway challenged this contention, as did also Mr. Bury, whose four-wheeled locomotives at that time occupied a prominent place in the attention of railway promoters and companies. Ultimately some locomotives were ordered from America, these being of the single-driver class with small diameter wheels. They were capable of taking loads of 74 tons up the grade and achieved a speed of 9¾ miles an hour as a maximum.

The difference between these figures and those achieved to-day may be gathered from the following table, which shows the number of wagons per train which can be dealt with in varying circumstances by engines of classes 1, 2 and 3 on the Midland Railway, with and without assistance.

	Class of Train Engine.		
	1	2	3
	No. of Mineral Wagons		
Without bank engine ...	8	8	8
With one ordinary bank engine	22	24	28
With two ordinary bank engines, or with bank engine No. 2290... ...	36	38	40

The average booked weight of the express passenger trains is about 210 tons, and of the secondary passenger trains, 145 tons, exclusive of engines. These weights are frequently exceeded in practice, and on the occasion noted by the writer the passenger train shown in one of the illustrations, with coaches from Bristol via Birmingham to York, must have been certainly 230 and probably 240 tons, loaded.

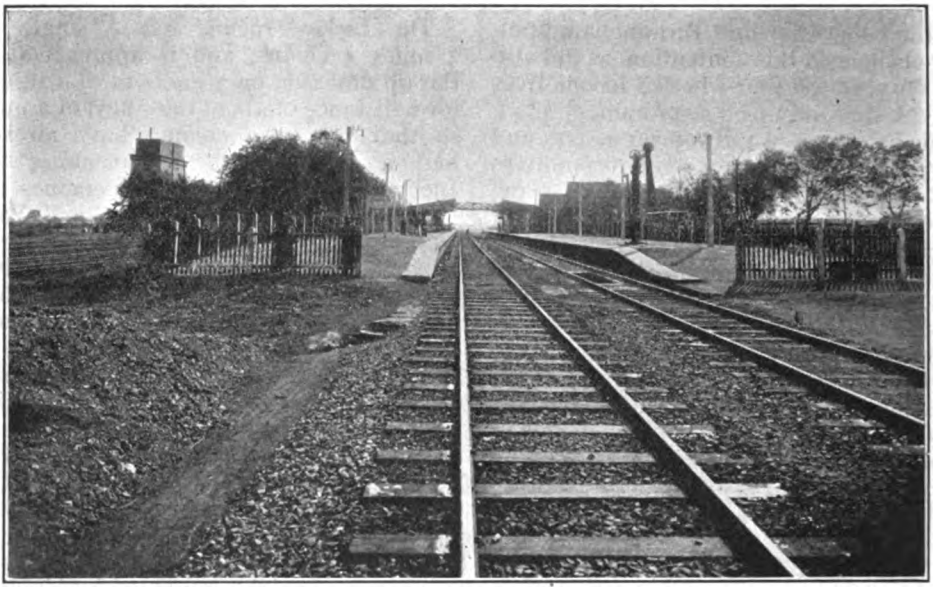
There are 23 passenger and 30 goods and mineral trains booked to ascend the Incline daily, 7 or 8 minutes being occupied by each passenger train, and 15 minutes by each freight train in running, in addition to which the section is occupied by the stoppage of the trains at Bromsgrove for the bank engine or engines, and again at Blackwell by the bank engines leaving the grade.

The Lickey Incline has a length of 2 miles 4 chains, and is approached in the up direction on a gradient of 1 in 105 for a distance of about one-third of a mile, so that the train engines have already had a fair pull before reaching the Incline proper. The banking engines are "attached" as a rule in the Goods Yard west of Bromsgrove Station, and the Incline at 1 in 37·7, starts just after clearing the station in a cutting extending for about a quarter of a mile up the grade, the rest being for the most part on an embankment to Blackwell Station, which marks the summit looking in the direction of Birmingham.

Some of the trains are banked by two 0-6-0 type side-tank engines, and others by three of these engines working together, the new locomotive, No. 2290, working turn and turn about with them. This engine made about eight return trips in two hours, and, of course, its water and coal supplies have to be replenished more frequently than when working on ordinary service. On reaching Blackwell Station the banking engines cross over to the down line and return along the down grade to Bromsgrove without steam, where they again cross to the up side at the far end of the Goods Yard, and are ready for making another trip on the Incline with a loaded train.

The scenery in the district is exceedingly attractive, and this, together with the activity on the railway and special conditions, provide a most interesting combined study to those who admire nature and are interested in railway working. The district is well worth a visit from RAILWAY MAGAZINE readers and others, as an excellent view of the Incline and train working can be obtained either from the platforms of Bromsgrove Station, from the overbridge at the Birmingham end of the platforms, or from the footpath which extends some distance along the down side of the Incline. Bromsgrove is reached from New Street Station, Birmingham, in about three-quarters of an hour by ordinary trains.

Digitized by Google



CHANGCHOW STATION.

The Shanghai-Nanking Line.

CHINESE GOVERNMENT RAILWAYS. [No II.]

By C. L. G. WAYNE and C. L. W. BAILEY.

CHINKIANG is a Treaty Port on the Southern bank of the Yangtze. A branch line runs from the station to the Bund. The changing condition of the river here is a matter of grave concern to the railway along with steamship companies, whose boats make Chinkiang a port of call on their journeys to and from Hankow. Notwithstanding the disabilities, however, a very large traffic is handled here by railway.

Nanking Ferry is a goods depôt and passenger station, situated on the south bank of the Yangtze River, with a large passenger pontoon, a wet dock and godowns and other requisites for the efficient handling of large quantities of goods.

It is at this station that connection is made with the Tientsin-Pukow Railway for travellers to and from the North and Europe. The ferry steamer waits at the pontoon directly adjoining the platforms, and is able to leave with passengers and baggage 15 min. after the arrival of the Limited Express train from Shanghai. This is a vital point in the service which brings Shanghai within 36 hours of Pekin, and—before the War—16 days of London.

The question of the provision of a train ferry between Nanking and Pukow has been before the management for the last few years. Such a ferry would avoid the present break in the journey necessitating transhipment of goods, with consequent loss of time and leakages which now take place, and would render possible the completion of the journey to and from the North in the same compartment in which one started his journey from Shanghai or Peking. Whilst it is not actually impossible to construct a tunnel under, or a bridge over, the Yangtze, the river bed is of such a nature that the cost would be enormous, and a train ferry appears to be a mucb more satisfactory solution.

Nanking (Hsikwaan) is the present terminus of the railway. Besides a con-

Digitized by Google

siderable passenger traffic, a large volume of goods traffic passes through the adjoining goods depôt. Large engine and carriage sheds are conveniently situated near the terminus. A connection has been made at this station with the Nanking City Railway.

To cope with the ever increasing number of trains, three new crossing stations are being provided to shorten the longest sections. These will be situated at Shuntsehmen, a short distance from Nanking; Lonetreehill which is losing its lonely name and will in future be known as "Tse Hsia San"; and at a point between Sinfeng and Chinkiang.

There are several types of locomotives in use on the railway, particulars of which are given below:—

Classification.	Diameter of Cylinder.	Diameter of Driving Wheel.	Tank or Tender.	Gross Weight of Engine and Tender.	Tractive Capacity.	Stock.
	inches.	inches.		tons.	lbs.	
"A" Class 4-6-2	18	57	Tank ..	74·35	22,610	2
"B" Class 4-6-0	18	57	Tender ..	102·55	22,610	10
"C" Class 4-4-0	18	79	Tender ..	98·35	16,310	12
"D" Class 4-2-2	18	84	Tender ..	98·70	15,340	4
"E" Class 4-4-2	20	84	Tender ..	109·30	18,943	4
"F" Class 2-4-2	17½	66	Tank ..	60·00	17,039	2
American 2-4-2	16½	63	Tank ..	50·00	14,150	1
"Bagnall" 0-6-0	15	43	Tank ..	32·50	14,200	2

With the exception of the American engine, which works the Woosung Line service, all the locomotives are of British build. The "A," "B," and "E" classes were obtained from the North British Locomotive Company, Ltd., which company is also responsible for two of the "C" class engines, the remainder of this class having been built by Messrs. Robert Stephenson and Company. The "D" and "F" class engines are exclusively of Messrs. Kerr Stuart and Company's build.

The "E" class engines, shipped out from England four years ago, are reserved for hauling the "up" and "down" Through Limited Expresses, which form connection with the services of the Northern railways. These last-named engines, which by the way, are fitted with "Robinson" superheaters, are of handsome appearance, and are doing very good work. One of this class was illustrated last month.

The maxim of the management so far as goods traffic is concerned is "full loads, and quick despatch," and the "B" class engine meets the heavy demands which have been put upon it for dealing with this traffic.

The "C" class is a type well suited for the fast and local passenger services, and is a very capable engine. The bulk of the work of hauling the passenger trains falls on these engines. One of these engines was shown on page 290 last month.

The coaching stock is of the four-wheeled bogie type on underframes 68 ft. long. The cars are entered at the vestibule ends, and there is through communication from end to end of each train. The Janney coupler has been adopted and the Westinghouse brake, with improved triple valves, has been fitted to all cars.

The passenger rolling-stock is equipped on the "Stone" patent system of electric train lighting, and it is worthy of record that the Shanghai-Nanking Railway was the first railway in China to adopt electricity as the illuminant in the whole of its passenger stock. The trains are heated by steam from the engine in winter, and electric fans are installed in first class coaches for use in the summer. Restaurant cars are run on all express and fast trains, and the night expresses also include sleeping cars.

Goods wagons are all of large capacity, and are constructed of steel throughout. The majority consist of: (1) medium-

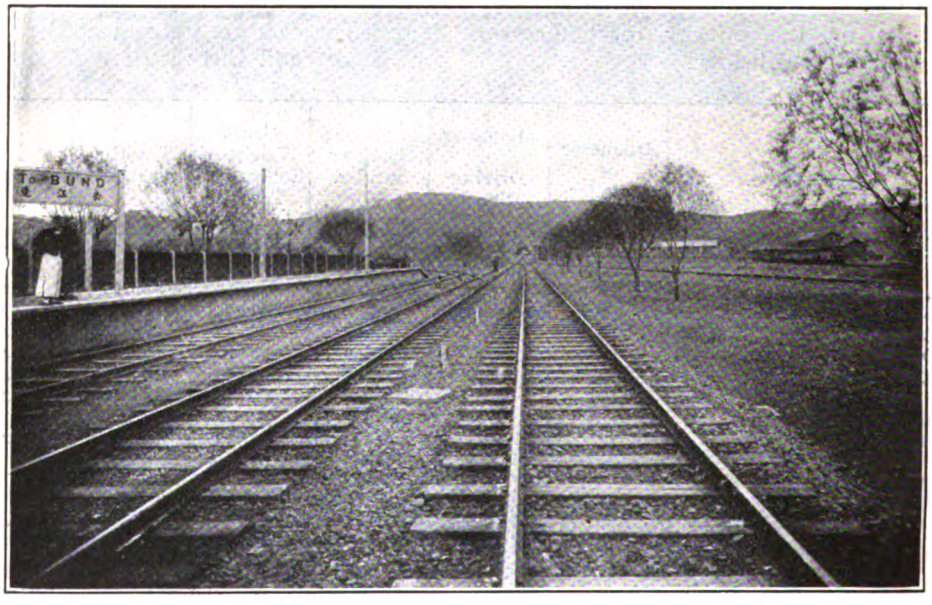
Digitized by Google

sized 4-wheeled bogie open wagons on 38 ft. underframes, with a carrying capacity of 35 tons; (2) all-steel covered bogie vehicles on 38 ft. underframes of 30 tons capacity; (3) all-steel 4-wheel cars on 22 ft. 6 in. underframes, 21 tons capacity; (4) all-steel bogie brake-vans on 38 ft. underframes with covered accommodation for a load of 15 tons; (5) wagons on 38 ft. underframes for special purposes such as livestock, and (6) tank wagons for the conveyance of oil in bulk.

The greater proportion of the goods traffic emanates from the districts served by the Tientsin-Pukow Railway and lines in connection therewith, and is transhipped over the Yangtze River from the terminus of that railway at Pukow to the Shanghai-Nanking Railway dock at Nanking Ferry. The management have wisely taken advantage of the fact that the traffic offers in bulk by providing vehicles of large capacity, and although the 21-ton wagon is quite useful, the 30-ton wagon meets with most favour. It may be mentioned that the railway does not possess a single goods wagon, open or covered, with a less capacity than 15 tons. All goods stock is fitted with the Westinghouse brake, which ensures much safer and faster running than would be possible with unbraked vehicles.

The main line is now worked on the electric staff system: until recently this only extended from Shanghai North to Soochow, but electric staff instruments have now been installed at all stations up to and including Nanking.

The goods train service is arranged on a simple control system, introduced by the Traffic Manager, Mr. Wayne, and placed in charge of the Chief Traffic Inspector. The majority of the goods trains are run in the night, which enables a much better utilisation of the line and stock to be made.



CHINKIANG STATION, SHOWING BRANCH LINE PLATFORM (TO RIGHT) AND TUNNEL.

Whilst the railway is beset by competition by water, the traffic has increased by leaps and bounds. Chinese merchants are more and more realising that "time is money," and appreciate the rapid, easy and safe means of transit afforded by the railway. Rates for the transport of merchandise by train bear favourable comparison with the charges for conveyance by boat. The present-day tendency is all towards speed and in catering for merchandise traffic one of the principal aims of the railway is that goods consigned to their care shall reach

Digitized by Google

their destination, no matter to what station on the system they are consigned, the morning following that on which they are handed over to them for transit. That the methods adopted to ensure the safety of goods are satisfactory is proved by the fact that practically the whole of the traffic is consigned at "owner's risk" rates and it is very exceptional that traffic is booked at railway risk. Claims are practically non-existent.

At present, the railway finds itself unable, with the existing rolling-stock, facilities and accommodation at its disposal, to deal with the vastly increased volumes of traffic awaiting conveyance to Shanghai. The stock is being worked to the absolute limit of its capacity. Engines are running between five and six thousand miles a month, or more than double the mileage run by other railways.

Wagons loaded at Nanking in the afternoon arrive at Markham Road the next morning, are unloaded within a few hours and are on the way back to Nanking the same afternoon or evening.

At no period in history perhaps, has there been such a promise of unlimited commercial expansion in China as there is to-day. By virtue of its geographical position the Shanghai-Nanking Railway forms the gateway to Shanghai which, even now the biggest commercial port of the Republic, will in all probability become the greatest centre of world trade on the Western Pacific. With the subsidence of political disturbances and internecine warfare with which the Chinese Republic has been afflicted there is bound to be a great growth of commercial and industrial enterprises. Not only has there been a remarkable development of goods traffic but the number of local passengers conveyed has increased enormously.

KUNSHAN STATION.

Arrangements have been in operation for some time past for the through booking of passengers, baggage and parcels, between the principal stations on the Chinese Government Railways, and between the principal stations on the South Manchuria, Chosen and Japanese Government Railways. With a view to encouraging tourist traffic from foreign countries to the Orient, tickets are issued at reduced rates for overland and circular tours by rail and steamer, detours and interchangeable routes being included to suit tourists' requirements. The fact that the

Digitized by Google

traffic has steadily increased shows that the facilities are approved by the travelling public.

With the opening up of new lines, the traffic from which, along with that from existing lines, will converge upon the Shanghai-Nanking Railway, the management have a formidable task before them, but given a free hand in the development of the railway there is no doubt that the result will be to the mutual advantage of the Chinese Government, the public and the staff.

Fire Brigades have been formed from members of the traffic staff at each major station, and a competition is held each year for a handsome shield and medals presented by the railway. Whilst Markham Road are the present holders, the brigade at Nanking Ferry has perhaps seen most service, and has rendered valuable assistance at several fires outside railway premises.

All the staff who come into contact with the public are able to speak and write English, and are courteous in manner and attentive to the passengers.

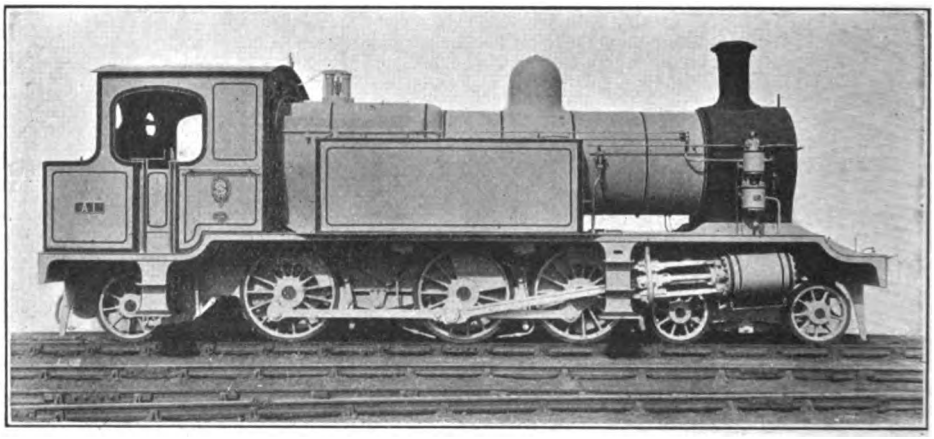
A school for the training of traffic employees was established at Shanghai in 1907, and was reorganised in 1915. Admission is gained by competitive examination. The school has a library and is fitted up with models of all the ordinary working appliances in daily use. A model railway track with electrically propelled locomotive, passenger coaches and points and signals, complete, embracing three stations has also been installed. This school is now under the supervision of the Assistant Traffic Manager, Mr. W. A. Richardson.

The fact that a large number of men who passed through this school are now occupying positions of responsibility on the Railway proves its success.

Enlargement is at present under consideration.

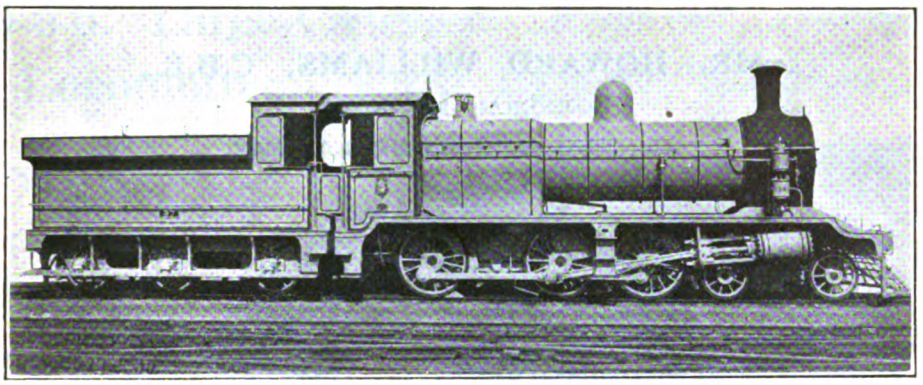
The railway has also had in operation for some time a higher-grade scheme for the training of engineers and surveyors. If, after the examination, a candidate's qualifications are found to be satisfactory, he is admitted to the rank of Probationary Student Engineer, and after specified periods he may advance successively to the grade of Engineering Student, Junior Assistant Engineer, Senior Assistant Engineer or Junior Assistant Surveyor and Senior Assistant Surveyor. Promotion in each branch and grade is by examination.

"A sound mind in a sound body" is a precept applied by the management who have gone to a good deal of trouble and expense in providing recreation grounds for their employees at Markham Road and Shanghai North. These grounds are well equipped for tennis, cricket and football, and a green has been provided for the lawn bowls players.



4-6-2 TANK ENGINE, CLASS "A."
Built by North British Locomotive Co., Ltd.

Digitized by Google



4-6-0 LOCOMOTIVE OF CLASS "B."
Built by North British Locomotive Co., Ltd.

Great enthusiasm is displayed in the annual competitions and the Sports' Meeting attracts a good many spectators.

It may be worthy of mention that the Engineer-in-Chief and General Manager of the line is Mr. A. C. Clear, M.Inst. C.E., who also acts as Engineer-in-Chief of the Shanghai-Hangchow-Ningpo Railway. He is the brother of Mr. E. A. Clear, Assistant General Manager, Great Central Railway.

Mr. C. L. G. Wayne, late of the General Manager's office, of the Great Central Railway, is the Traffic Manager of both Lines, and Mr. W. A. Richardson, who left the Great Central early in 1918, holds the dual position of Assistant Traffic Manager.

RAILWAY YEAR-BOOK.

THE number of people who for one reason or another are interested in railway statistics or in the management of the undertakings is somewhat considerable, and the "Whitaker of the railway world," as the Railway Year Book is not inappropriately called, is sure of a wide public year by year. In the 1920 edition now published, greater attention than hitherto is paid to the railways in British dominions, and also other countries in which British capital and enterprise are prominent. The home railway section, too, has been improved and is now very complete. The book is published at 5s. net by the Railway Publishing Company.—*The Manchester Guardian.*

Digitized by Google

MR. HOWARD WILLIAMS, C.B.E.,

GENERAL MANAGER,

CENTRAL ARGENTINE RAILWAY.

Elliott] [*& Fry.*

MR. HOWARD WILLIAMS, C.B.E., Assistant General Manager, London & North Western Railway, who has been appointed to succeed Mr. C. H. Pearson as General Manager, Central Argentine Railway, has had a wide, varied and valuable experience on the London & North Western system, where he has held the following positions: 1905, Assistant to the South Staffordshire District Goods Manager; 1911, Assistant Liverpool District Goods Manager; 1913, head of the Conciliation Department; 1915, Mineral Traffic Manager; 1918, Assistant General Manager. During the war his services were utilised by the Ministry of Munitions as a Director of Inland Transport, and later as Assistant to the Coal Controller. Last autumn he acted as adviser, in regard to British railways, to the Employers' Delegate to the International Labour Conference at Washington. He was recently appointed by the Minister of Transport a member of the Central Wages Board for British railways.

Digitized by Google

4-6-0 Three-Cylinder Express Goods Locomotive, North Eastern Railway.

CONTINUING his policy of applying the three-cylinder principle of design, Sir Vincent Raven, K.B.E. M.Inst.C.E., M.I.Mech.E., Chief Mechanical Engineer, North Eastern Railway, is now introducing a new class of 4-6-0 engine—designed more particularly for express goods and mixed traffic duties—including this feature, one of which is now illustrated.

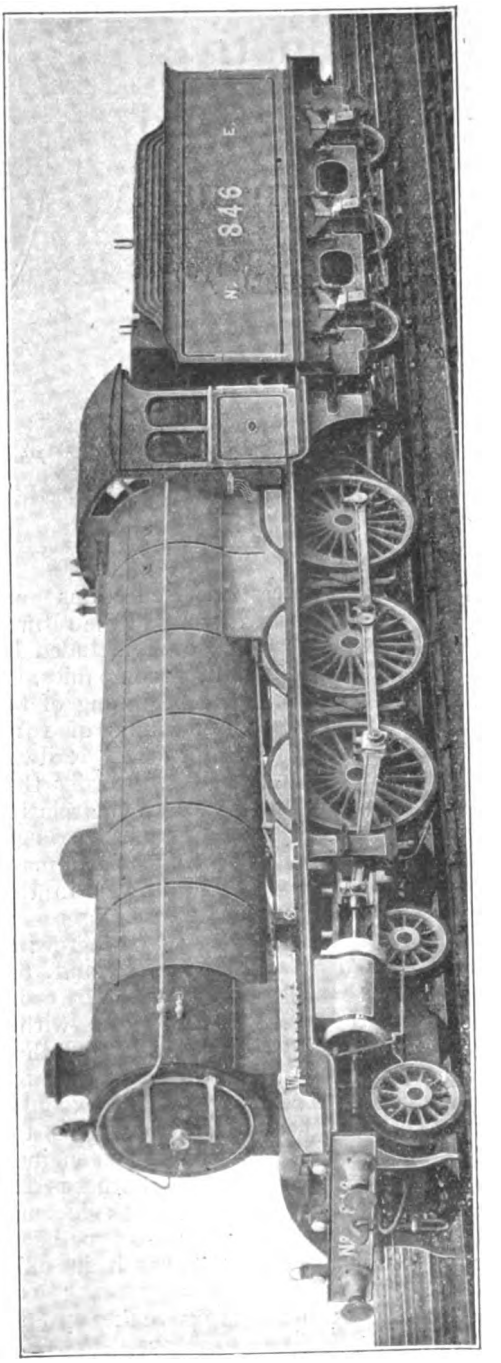
These locomotives were built at the Darlington Works of the North Eastern Railway, and have cylinders 18½ in. diam. by 26 in. stroke. Bogie wheels are 3 ft. 1¼ in. diam., and coupled wheels 5 ft. 8 in. diam., spread over a wheel-base of 13 ft. 6 in. The three cylinders and valve chests are formed in one casting, the steam chests being common to all three cylinders, though the three exhaust chambers are separate to the bottom of blast pipe.

Working steam pressure is 180 lb. pressure per sq. in., and at 85 per cent. of the boiler pressure the maximum tractive force works out at 30.032 lb. Heating surface is as follows :—

102 Tubes (2 in. dia.)	866	sq. ft.
24 Smoke tubes (5¼ in. dia.) ..	531.9	,,
24 Superheater elements ..	530.1	,,
Firebox	166	,,
Total ..	2,094	,,
Grate Area	27	,,

Length of firebox is 9 ft. by 3 ft. 11 in. wide, and the diameter of the boiler barrel is 5 ft. 6 in.

These locomotives are fitted with self-trimming tenders, having a capacity of 5½ tons of coal and 4,125 gall. of water. In working order the engine weighs 77 tons 14 cwts., and the tenders an additional 46 tons 2 cwts. Total weight of engine and tender 123 tons 16 cwts. The total length of engine and tender over buffers, is 62 ft. 6 in.



Digitized by Google

British Locomotive Practice and Performance.

By CECIL J. ALLEN,
A.M.Inst. T.

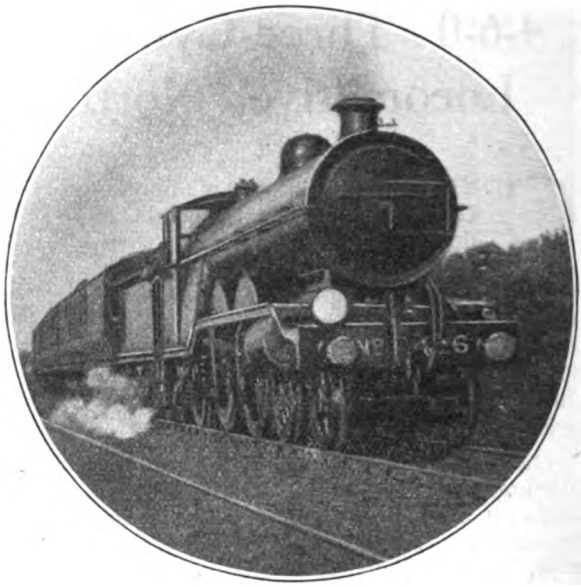


Photo.] [*E. Chas. Riley.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY.

Worthing to London express passing Southwick.
4-4-2 locomotive, No. 426.

SOME interesting reflections are provoked by a study of the returns of locomotive stock included by the various railway companies, for the first time since the beginning of the war, in their annual accounts of 1919. These are given in detail in the "Railway Year Book" for 1920, but in order that attention may be directed to the relative popularity of the different arrangements of wheels, and comparison made of the practice of each railway in this respect, I have collected the figures in two tables, which are set out herewith. The first deals with tender, and the second with tank locomotives. In order to keep the size of the tables within reasonable limits, I have restricted their compass to those railways owning 100 steam locomotives or over. This excluded two companies by narrow margins, the North London Railway having 99 engines, and the Cambrian 98. The former is distinguished by employing tank locomotives only, the 77 of the 4-4-0 type being considerably the largest batch in existence of this wheel arrangement; one 0-4-2 and 21 0-6-0 tanks make up the total.

In comparison with the tank engines, the tender locomotives resolve themselves into but few classes Indeed, five types make up 91.1 per cent. of the total of tender engines—0-6-0, 49.0 per cent.; 4-4-0, 22.5 per cent. 0-8-0, 7.5 per cent.; 4-6-0, 6.7 per cent; and 2-4-0, 5.4 per cent. Also, out of the total, 31.6 per cent. are 4-coupled engines, 58.1 per cent. 6-coupled, and 9.5 per cent. 8-coupled. As regards individual classes, it is noteworthy that of tender engines the Midland Railway has the largest number of every type amongst which it figures, the total of 1,513 0-6-0 engines in particular being the largest single item in either table. This statement is also true in regard to the experimental eight-cylinder 2-6-2 No. 2299, and to the 0-10-0 Lickey banking engine, No. 2290, seeing that no other company has any engines of these wheel arrangements. Pride of place in the matter of 4-6-0 and 0-8-0 locomotives goes to the London and North Western Railway, by a very handsome margin in both instances. R.O.D. 2-8-0 engines do not figure in the table, as they are regarded in the nature of a loan to the various companies which have taken them over, while the shortage of engines remains acute; had

Digitized by Google

they been included, the total of "Consolidations" would, of course, have been greatly increased. The Great Central Railway, to whose standard designs they conform, leads the way with 143 engines of this wheel arrangement. It is interesting, if melancholy, to record for the first time a reduction in both the Midland and North Eastern totals of 4-2-2 engines, as an indication that a commencement has been made with the scrapping of these famous engines; the 2-2-2 type has vanished altogether. Two companies—the Glasgow and South Western and North British—can lay claim to the curiosity of a 0-4-0 tender engine, while still more curious is the fact that the one and only tender type operated by the Great North of Scotland Railway is the 4-4-0, used indiscriminately for passenger and goods service. Of tender types the Taff Vale Railway also owns one only—the 0-6-0—but this is less surprising in that all new constructions of that company, both passenger and goods, are of tank types, in view of the short total distances traversed.

Tank engines run to a total of 9,248, against the 14,649 of the tender engines, the proportions of the grand total working out at almost exactly 40 and 60 per cent. respectively. Of the tank engine totals, 38.6 per cent. of the engines are 4-coupled and 59.4 per cent. 6-coupled, while only 1.9 per cent. comprises all the 8-coupled types. It is thus interesting to reflect that well over one-half the total number of locomotives in this country have 6-coupled wheels. Although the number of tank classes figuring is considerably greater than those in the tender engine table, those in the commonest use are again confined to comparatively few arrangements of wheels. Of the total of 9,248, 90.4 per cent. is made up as follows:—0-6-0, 38.9 per cent.; 0-6-2, 15.7 per cent.; 0-4-4, 13.1 per cent.; 2-4-2, 10.8 per cent.; 4-4-2, 5.3 per cent.; 0-4-0, 3.4 per cent.; and 0-4-2, 3.2 per cent. As regards the maximum number

BRITISH TENDER LOCOMOTIVES.

RAILWAY.	Single.	Four-coupled.					Six-coupled.					Eight-coupled.		Ten-coupled.
	4-2-2	0-4-0	0-4-2	2-4-0	4-4-0	4-4-2	0-6-0	2-6-0	2-6-2	4-6-0	4-6-2	0-8-0	2-8-0	0-10-0
Barry R. ..	—	—	—	—	—	—	—	—	—	—	—	4	—	—
Caledonian R. ..	1	—	31	2	155	—	386	5	—	53	—	8	—	—
Furness R. ..	—	—	—	3	20	—	60	—	—	—	—	—	—	—
G. & S.W.R. ..	—	1	56	6	180	—	179	11	—	19	—	—	—	—
G.C.R.	6	—	—	7	148	31	411	—	—	55	—	89	143	—
G.E.R.	—	—	—	102	171	—	435	—	—	40	—	—	—	—
G.N.R.	—	—	33	62	136	116	419	50	—	—	—	55	21	—
G.N.R. (1) ..	—	—	—	9	75	—	86	—	—	—	—	—	—	—
G.N.S.R. ..	—	—	—	—	97	—	—	—	—	—	—	—	—	—
G.S. & W.R. ..	—	—	—	12	85	—	135	11	—	7	—	—	—	—
G.W.R.	—	—	—	78	368	3	435	261	—	138	1	—	105	—
Highland R. ..	—	—	—	3	80	—	12	—	—	46	—	—	—	—
H. & B.R. ..	—	—	—	9	5	—	94	—	—	—	—	15	—	—
L. & Y.R. ..	—	—	—	1	71	40	540	—	—	20	—	274	—	—
L. & N.W.R. ..	—	—	—	137	300	—	694	—	—	482	—	480	32	—
L. & S.W.R. ..	—	—	90	—	*308	—	79	—	—	46	—	—	—	—
L.B. & S.C.R. ..	—	—	26	—	58	11	67	10	—	—	—	—	—	—
Midland R. ..	93	—	—	267	391	—	1513	—	1	—	—	—	—	1
M.G.W.R. ..	—	—	—	32	22	—	68	—	—	—	—	—	—	—
N.B.R.	—	2	—	6	188	20	525	—	—	—	—	—	—	—
N.E.R.	17	—	—	54	189	72	749	—	—	70	—	168	—	—
N.S.R.	—	—	—	3	5	—	49	—	—	—	—	—	—	—
S.E. & C.R. ..	—	—	—	—	249	—	203	1	—	—	—	—	—	—
T.V.R.	—	—	—	—	—	—	45	—	—	—	—	—	—	—
TOTAL ..	117	3	236	793	3,301	293	7,184	349	1	976	1	1,093	301	1

* Includes six engines of 4-2-2-0 type.

Digitized by Google

of these familiar types, honours are fairly evenly divided. In 0-6-0 tanks the Great Western Railway leads the way with the amazing total of 1,100; the London and North Western leads in 0-6-2's; the Midland, closely followed by the London and South Western, in 0-4-4's; the Lancashire and Yorkshire in 2-4-2's: the London and South Western in 4-4-2's; the Lancashire and Yorkshire in 0-4-0's; and the Great Western in 0-4-2's. As regards the largest number of individual types, the Great Western and Great Central tie with 12 each, or with 20 each, if tender engines be included. In both cases the taking over of the locomotive stock of certain smaller lines has been responsible for additions to the number of wheel arrangements, the 0-8-2 tanks in the Great Western case, for example, being the American-built engines off the Port Talbot Railway, while the Great Central Railway has acquired a 0-8-0 tank from the Wrexham, Mold and Connah's Quay Railway, and both 0-4-4 and 0-6-4 tanks from the Lancashire, Derbyshire and East Coast Railway.

Of single-driver tank engines only three types remain—the 2-2-0 rail motor engines on the London and South Western Railway, the 2-2-4 inspection engines on the North Eastern Railway, and a couple of 2-2-2 tank engines, which do not figure in the table, on the Dublin and South Eastern Railway. Among lines not represented, the Wirral Railway has about the most remarkable variety of tank engines for its size, there being three 2-4-2's, eight 0-4-4's, one 4-4-2, two 4-4-4's, and two 0-6-4's, making up a total of sixteen engines! Both this company and the Midland and South Western Junction Railway preceded the North Eastern Railway in the construction of tank engines of the 4-4-4 type. The Midland Great Western Railway of Ireland is notable by reason of using only one tank engine type—the 0-6-0. In general the most curious feature of tank locomotive practice in Great Britain is the variety in the matter of wheel arrangement that has characterised the bulk of recent constructions. Thus the 0-8-4 and 4-4-4 and 2-8-0 types each appear on one line only, and the 4-8-0, 0-8-0, 4-6-4, 2-6-4 and 2-6-2 in each case on two lines only, except for one or two isolated examples on minor lines, such

Photo.] GREAT CENTRAL RAILWAY. [*K. A. C. R. Nunn.*

Marylebone–Northwood train leaving Marylebone. 4–6–2 superheater tank engine No. 128.

Digitized by Google

BRITISH TANK LOCOMOTIVES.

RAILWAY.	Single.		Four-coupled.								Six-coupled.							Eight-coupled.				
	2-2-0	2-2-4	0-4-0	0-4-2	2-4-0	2-4-2	0-4-4	4-4-0	4-4-2	4-4-4	0-6-0	0-6-2	2-6-2	0-6-4	4-6-2	2-6-4	4-6-4	0-8-0	0-8-2	2-8-0	0-8-4	4-8-0
Barry R.	—	—	—	—	—	13	4	—	—	—	38	72	—	10	—	—	—	—	7	—	—	—
Caledonian R. ..	—	—	48	2	—	1	144	12	—	—	193	—	—	—	12	—	—	6	—	—	—	—
Furness R. ..	—	—	1	—	—	3	—	—	6	—	21	23	—	—	—	—	—	—	—	—	—	—
G. & S.W.R. ..	—	—	11	—	—	—	21	—	—	—	18	28	—	—	—	—	—	—	—	—	—	—
G.C.R.	—	—	2	—	6	49	6	—	52	—	91	205	—	9	21	20	—	1	—	—	4	—
G.E.R.	—	—	14	—	—	235	40	—	—	—	262	2	—	—	—	—	—	—	—	—	—	—
G.N.R.	—	—	—	—	—	—	47	—	60	—	265	54	—	—	—	—	—	—	41	—	—	—
G.N.R. (1)	—	—	1	—	—	6	—	13	5	—	1	4	—	4	—	—	—	—	—	—	—	—
G.N.S.R.	—	—	—	4	—	—	9	—	—	—	9	—	—	—	—	—	—	—	—	—	—	—
G.S. & W.R. ..	—	—	2	3	—	7	19	—	14	—	18	2	—	4	—	—	—	—	—	—	—	1
G.W.R.	—	—	5	155	122	36	—	1	31	—	1100	26	167	2	—	—	—	—	5	70	—	—
Highland R. ..	—	—	—	—	1	—	5	8	—	—	6	—	—	8	—	—	—	—	—	—	—	—
H. & B.R.	—	—	6	—	—	—	—	—	—	—	31	24	—	—	—	—	—	—	—	—	—	—
L. & Y.R.	—	—	77	—	1	332	1	—	—	—	243	22	20	—	—	—	—	—	5	—	—	—
L. & N.W.R. ..	—	—	17	20	15	252	—	3	50	—	293	380	—	—	47	—	—	—	30	—	—	—
L. & S.W.R. ..	2	—	31	—	3	—	215	—	80	—	55	—	—	—	—	—	—	—	—	—	—	—
L.B. & S.C.R. ..	—	—	—	112	—	—	36	—	62	—	88	134	—	—	2	—	2	—	—	—	—	—
Midland R. ..	—	—	33	—	—	—	230	—	70	—	358	14	—	40	—	—	8	—	—	—	—	—
M.G.W.R.	—	—	—	—	—	—	—	—	—	—	17	—	—	—	—	—	—	—	—	—	—	—
N.B.R.	—	—	39	—	—	—	30	33	45	—	105	65	—	—	—	—	—	—	—	—	—	—
N.E.R.	—	4	24	—	—	60	183	—	—	20	248	102	—	—	30	—	—	—	—	—	—	10
N.S.R.	—	—	—	—	20	6	5	—	7	—	53	28	—	16	—	—	—	—	—	—	—	—
Rhymney R. ..	—	—	—	—	—	2	—	—	—	—	36	88	—	—	—	—	—	—	—	—	—	—
S.E. & C.R. ..	—	—	3	—	—	—	213	—	—	—	46	—	—	5	—	1	—	—	—	—	—	—
T.V.R.	—	—	2	—	—	—	—	3	6	—	14	181	—	—	—	—	—	—	—	—	—	—
TOTALS ..	2	4	316	296	168	1,002	1,208	73	488	20	3,609	1,454	187	98	112	21	10	7	88	70	4	11

Digitized by Google

as two 4-4-4 tanks each on the Wirral and Midland and South Western Junction Railways, one 0-8-0 on the Kent and East Sussex Railway, seven 2-6-2's on the Alexandra (Newport and South Wales) Docks and Railway, and 2-6-4's on the County Donegal Joint Committee's lines. The 4-8-4 wheel arrangement is confined to the Londonderry and Lough Swilly Railway, and the 4-6-0 in tank engines to the Cork, Bandon and South Coast Railway. Various other interesting conclusions might be drawn from the tables but it is now time to turn to performance.

Photo.] **GREAT CENTRAL RAILWAY.** [*F. W. Curtis.*

Manchester–London express. 4-4-0 engine No. 433, "Walter Burgh Gair."

This month I propose to deal with a few recent Great Central runs—none of them of superlative merit, but all of them, as always on this railway, deserving in at least some particular of description. I will commence with two on the ever-popular 3.15 p.m. *ex*-Marylebone. On the first occasion we had as load four of the large 60-ft. corridor eight-wheelers and three non-corridor vehicles of the same type, all fitted with Mr. Robinson's anti-telescoping devices, which appear from the weights recorded on the coaches to have raised the tare of each vehicle by about two tons. Consequently the total tare weight of the train was 258 tons, and the full weight about 285 tons. This was greatly increased on the second occasion, which happened to be the Monday after the Cup Final; consequently, to convey the unsuccessful team and their supporters back to Huddersfield we had an extra corridor saloon, and a non-corridor third in front of the train "set," which is now composed entirely of corridor stock. In addition to this, the same day was chosen for the running of an experimental slip coach to Brackley, so that we left London with the heavy load, for such a road as the Great Central Railway, of nine cars, eight of which were of the largest stock, weighing 322 tons empty, and not less than 345 tons full, the train being crammed. This was the heaviest unpiloted load I have ever timed out of Marylebone; the engine was No. 430, *Purdon Viccars*, of the 4-4-0 "Director" class. There was a brisk west wind, which increased to great force beyond Woodford, and hampered us considerably. On the first run the engine was No. 435, *Sir Clement Royds*, also of the "Director" class.

To Neasden Junction there is first

Digitized by Google

the steep rise to Kilburn, culminating in a strip at 1 in 87, and then the sharp fall to Neasden, on which the two maximum speeds were 60 and 61 m.p.h.; this initial 4.8 miles took 9 min. 25 sec. and 10 min. 20 sec. On the 1 in 94-105 to Harrow speed fell to 43½ and 41 m.p.h., and we passed that station, 9.2 miles, in 14 min. 20 sec. and 15 min. 10 sec. At Pinner we had recovered to 61½ and 57 m.p.h., but up the 1 in 145 to Northwood the rates fell to 54 and 48 m.p.h.; on the subsequent descent to Rickmansworth we touched 67 and 64½ m.p.h. load means to an unpiloted 4-4-0 on the Great Central Railway. It seemed excellent work to me that in such circumstances No. 430 sustained 29 m.p.h. steadily up the last mile or so of the climb; No. 435's minimum was 33 m.p.h., and for the 6.4 miles from Rickmansworth to Amersham the lighter train required 11 min. 20 sec., and the heavier, beginning the climb at a higher speed, taking 11¾ min. On the Missenden "dip," the highest speeds were 70½ m.p.h. in each case, and on the short subsequent rise 51 and 48½ m.p.h. were the minima;

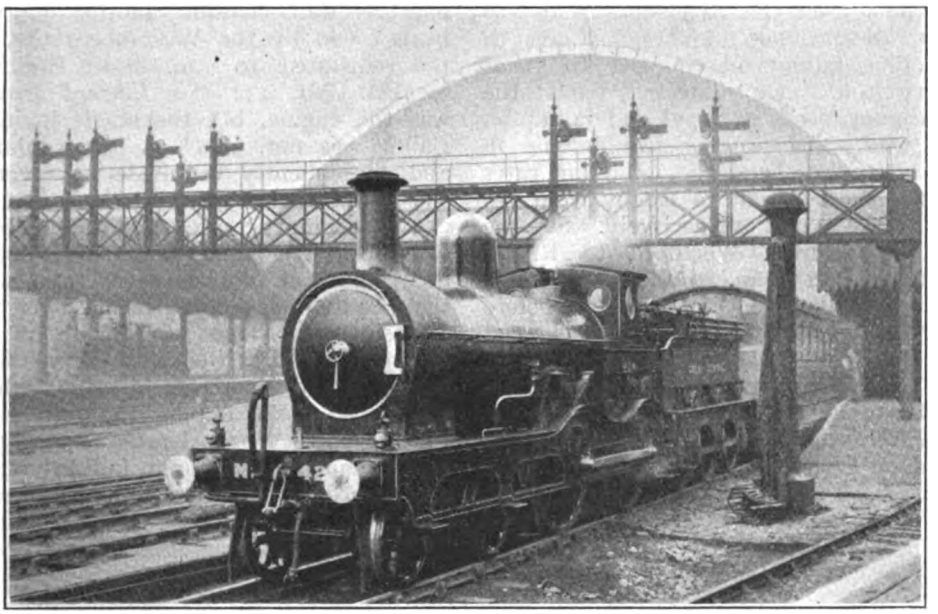


Photo.] GREAT CENTRAL RAILWAY. [*P. F. Cooke.*

Old 4-4-0 engine No. 424 at Manchester (Central).

on the respective trips. So the times to Northwood, 13.7 miles, were 19¼ min. and 20 min. 25 sec., and to Rickmansworth 17.2 miles, 22 min. 50 sec. and 24 min. 10 sec. Here we reduced speed as usual, but to a greater degree on the first than on the second run, before embarking on the six-miles' ascent at 1 in 105 to Amersham. For an understanding of the severity of such a climb, one needs to consider the Holloway bank of the Great Northern Railway—so great a difficulty to heavy down expresses—as multiplied in length by five, and it then becomes more easy to realise what a 345-ton descending to Aylesbury No. 435 touched 79 m.p.h., but No. 430 ran much more moderately, and did not exceed 71½. It was at this rate that Aylesbury was passed in the latter case, whereas No. 435 reduced speed to 55 m.p.h. So Aylesbury, 38 miles, was breasted in 48 min. 5 sec. and 50 min. 50 sec., and Quainton Road Junction, 44.4 miles, in 54 min. 55 sec. and 57¼ min.

Reducing speed here on both runs to a shade over 40 m.p.h., we passed Grendon Junction, 46.8 miles, in 57¾ min. and 60 min. 5 sec., and then settled down to the long adverse stretches at 1 in 176

Digitized by Google

which extend to well beyond Brackley. On the five miles of Finmere bank, of which 3¼ are at that inclination, we fell to 46½ and 44½ m.p.h.; the 4½ miles of Brackley bank (four at 1 in 176) produced minima of 47½ and 46½ m.p.h. respectively. So the 12.5 miles from Grendon to Brackley occupied 14¼ min. and 13 min. 55 sec. (No. 430 had picked up remarkably well from Quainton Road), and the 9.8 miles thence to Woodford, 11 min. 35 sec. and 10¾ min.. On the last-mentioned stretch No. 435 was delayed by a p.w.r. slack at Culworth, whereas No. 430, with load now reduced by the loss of the Brackley slip to 310 tons, touched 65 m.p.h. at Culworth Junction, falling subsequently to 51 at Charwelton. On Catesby bank the maximum speeds were 77½ and 74 m.p.h., the wind now proving troublesome in the latter case, and the minimum rates on the short ascent to Rugby were 61½ and 54½ m.p.h. respectively. So the 14.1 miles from Woodford to Rugby were run in 13 min. 10 and 50 sec. On the 3¼ miles ascent at 1 in 176 before Lutterworth, commenced at 71½ and 64½ m.p.h., we fell to 53 and 52½ m.p.h., the 6.8 miles from Rugby to Lutterworth taking 6¾ and 7¼ min., but the final descent to Leicester was a disappointment on each run, being hampered by a p.w.r. slack check on the first trip, while the wind prevented any higher speed than 72½ m.p.h. on the second. Thus the total times from London to Leicester, 103.1 miles, were 117 min. 10 sec. or 114 min. net, on No. 435's run, and 118¼ min. on that of No. 430. The latter engine had lost 2½ min. on schedule, but in consideration of gradients, load and weather, one cannot regard the performance as other than excellent for a 4-4-0 engine. In particular, the time of 82 min. 5 sec. for the 79.5 miles from Amersham to Leicester was a fine one in such circumstances.

Before carrying on from Leicester, I may as well mention another journey from town, by the Wycombe route, on the reinstated 10 a.m. down Bradford express. No. 432, *Sir Edward Fraser*, was the engine, but the magic hand of Bailey was not, alas! at the regulator, and consequently we made no records. The load was a six-coach large set of 212 tons empty; gross load was about 220 tons. We passed Neasden Junction in 9¼ min., at reduced speed, and were then badly delayed, as usual, over the diversion which has been made at the site of the slip in the cutting near Sudbury. So to Northolt Junction, which we passed at 40 m.p.h., the 11.6 miles took 21 min. We accelerated to 59 m.p.h. at Denham, and did not fall below 50 on Gerrard's Cross bank; on the descent

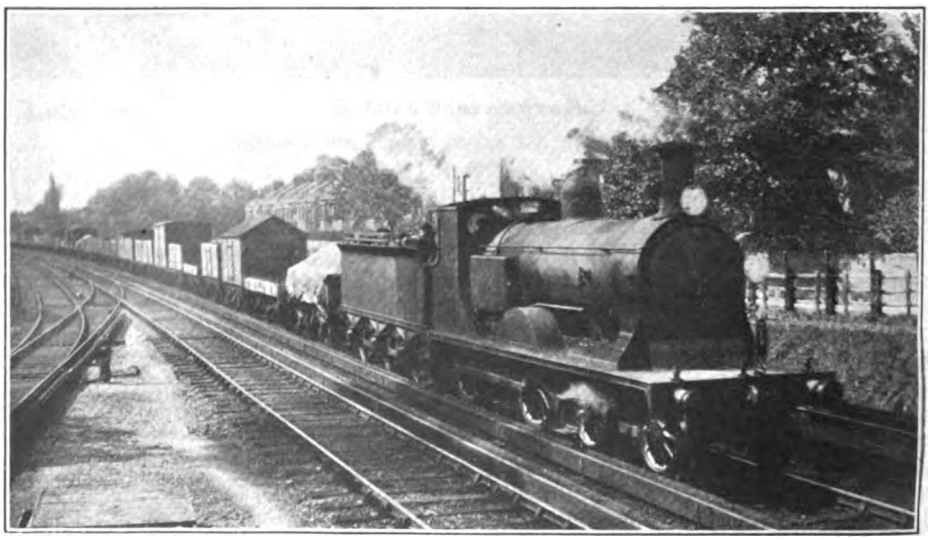


Photo.] [LONDON & SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

4-4-0 mixed-traffic engine No. 435 on up goods train approaching Hounslow.

Digitized by Google

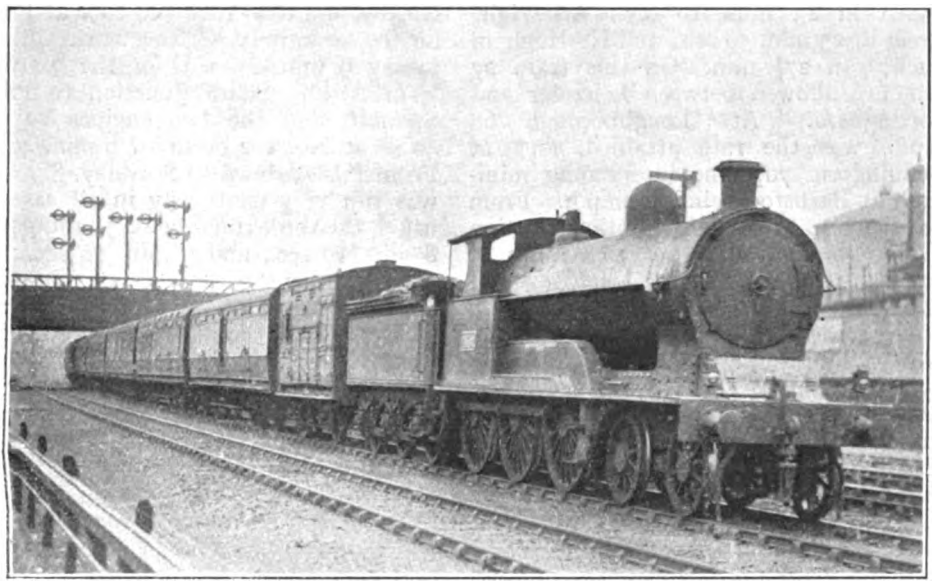


Photo.] LONDON & NORTH WESTERN RAILWAY. [*F. E. Mackay.*

Up Manchester express. 4–6–0 locomotive, No. 2639, "Bactria."

to Wycombe the maximum was 67 m.p.h. The 11.4 miles from Northolt up to Beaconsfield occupied 13 min. 25 sec.—and the 4.9 miles thence to Wycombe 5 min. 25 sec.—total 39 min. 50 sec. for the 27.9 miles from London. Schedule is 38 min., but of course the delays more than accounted for the small loss. Leaving Wycombe we attained 49 m.p.h. up the continuous 1 in 179-164 of Saunderton bank—a good piece of work—and passed Princes Risborough, 8.1 miles, in 11 min. 35 sec. Attaining 72½ m.p.h. on the subsequent descent, we covered the 9.4 miles on to Ashenden Junction in 8¾ min., and the 5.9 miles thence to Grendon Junction in 6 min. Falling to 51 m.p.h. on Finmere bank, and the same rate on Brackley bank, we ran the Grendon-Brackley length in 13¼ min., but were brought almost to a stand by relaying operations at Culworth, the time from Brackley to Woodford being 12 min. 55 sec. Wycombe to Woodford, 45.7 miles, thus took 52½ min., but without the concluding delay we should probably just have managed to keep the schedule time of 50 min. From Woodford to Rugby we ran the 14.1 miles in exactly 16 min., start-to-stop, with a top speed of 75 m.p.h. on Catesby bank. Rugby to Leicester took 5 sec. under 22 min. for the 19.9 miles, with no higher speed than 70½ m.p.h. on Ashby bank. On both these lengths schedule was just maintained. The driver was not responsible for any of the lost time, but the running was distinctly uninspired.

Little need be said of the running in the north-bound direction from Leicester to Sheffield. The last mentioned train was taken forward by the pioneer inside-cylinder 4-6-0, No. 423, *Sir Sam Fay*, which lost ¾-min. on the 26 min. schedule to Nottingham. This is, of course, a tight time for 23.4 miles of hilly road, but the maxima were low, only reaching 71½ m.p.h. at Loughborough and 72½ at Ruddington, while the minimum rate at Barnston was 51½ m.p.h. Loughborough 9.8 miles, was passed in 12 min. 40 sec., and Arkwright Street, 22.5 miles, in 24 min. 55 sec. Of the 285-ton load on the 3.15 p.m. down two "Atlantics"—Nos. 1088 and 1092—made light, passing Loughborough in 12¼ min., at 74 m.p.h., and reaching Nottingham in 26 min. 5 sec., after a second maximum of 74 at Ruddington. The 310-ton train was, however, entrusted to one 4-4-2 only—No. 192—but good running was made with such a load, and in spite of the strong side wind, Loughborough being

Digitized by Google

passed in 13 min. 10 sec., Arkwright Street in 25 min. 50 sec., and Nottingham reached in 27½ min. On this train 27 min. are allowed between Leicester and Nottingham. At Loughborough 68 m.p.h. was the rate attained, and at Ruddington 70½, the intervening minimum at Barnston being 51 m.p.h. From Nottingham to Kirkby South Junction is an unbroken ascent of 10·8 miles at 1 in 130-132, save for the brief downhill mile past Bulwell Common; No. 423 required 18¾ min. for this length, but the two "Atlantics" surmounted it in great style in 15 min. 5 sec. from the start. No. 192, unaided, took 20¾ min., maintaining a speed of 30½ m.p.h. up the last two miles. There is a clear comparison here between the work of the 4-4-2's and the 4-4-0 "Directors," as one of the former had, earlier in the same journey, maintained 29 m.p.h. up six miles at 1 in 105-110—a much steeper incline—with a load 35 tons heavier. No. 423 was slacked for p.w. repairs at Kirkby, and Nos. 1088 and 1092 at Pilsley for the same purpose, the first-mentioned taking 9 min. 25 sec. for the 7.1 miles from Kirkby South Junction to Pilsley Summit, and the two engines 10 min. 40 sec.; No. 192 occupied 9 min. 40 sec. From Pilsley down to Staveley, 8.3 miles, was run very cautiously in all cases, as usual, the three times being 7 min. 55 sec., 8 min. 10 sec., and 9 min. 10 sec.; the 12 miles thence over Darnall Summit to Sheffield occupied 15¾ min., 16 min. 50 sec., and 15 min, 50 sec. Total times from Nottingham, including more than the usual slacks on the first two runs, were 51 min. 50 sec., 50¾ min., and 55 min. 25 sec., against schedules of 50, 52, and 52 min.

It was only the two 3.15 p.m. runs that I continued to Manchester, and I include another one on the same train that I commenced at Sheffield. Taking them in order of load, No. 363, an unpiloted "Atlantic," had a six-coach train of 240 tons: Nos. 1088 and 1092

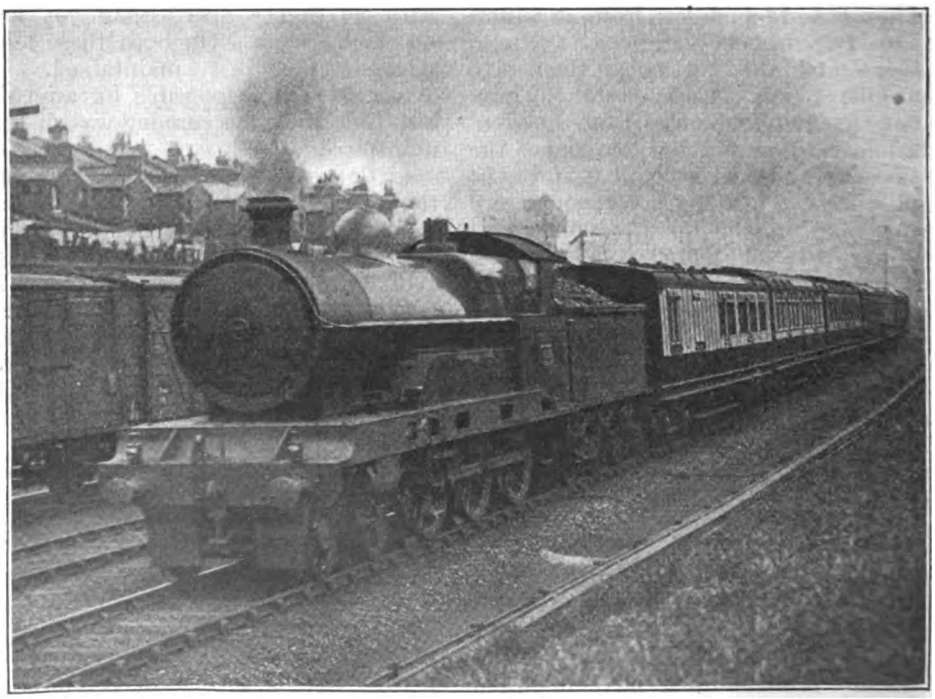


Photo.] LONDON & NORTH WESTERN RAILWAY. [*F. E. Mackay.*

Down Manchester express. 4-6-0 four-cylinder superheater express locomotive, No. 2222, "Sir Gilbert Claughton," fitted with bogie shields.

Digitized by Google

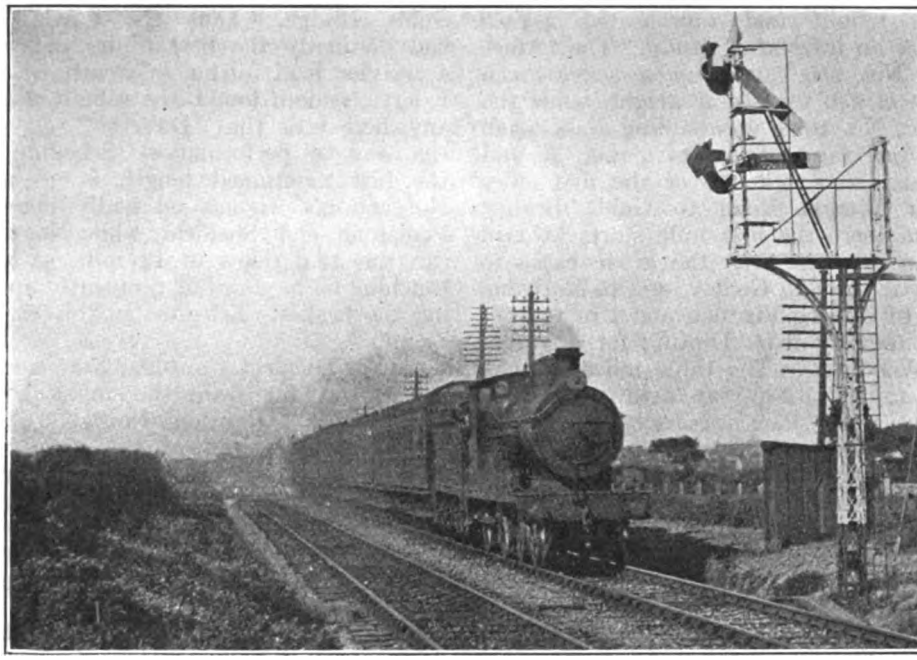


Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*A. Rigamonti.*

Down Victoria–Ramsgate express near Westgate. 4–4–0 engine, No. 35.

continued with their seven-coach 285-ton train, while No. 192, with the eight-coach 310-ton train, had the services of No. 1031, 4-4-0, as pilot to Guide Bridge. From Sheffield the adverse grade is at 1 in 132 to Oughty Bridge, 1 in 120 thence to a mile beyond Wortley, 1 in 131 for two miles further, and 1 in 160 thence to Penistone. Oughty Bridge, 4.8 miles, was passed in 9½ min., 9 min. and 8 min. 40 sec.; Wortley, 8.8 miles, in 16 min. 10 sec., 15½ min. and 14 min. 55 sec., and Penistone was reached in 23 min. 25 sec., 22 min. 25 sec. and 21 min. 25 sec., a very curious coincidence. Schedule is 24 min. At Oughty Bridge the trains had accelerated to 36½, 39 and 41½ m.p.h., but at Wortley the rates had fallen to 36, 37 and 40 m.p.h., while on the last trip we attained 42½ m.p.h. on the 1 in 160 before stopping at Penistone. Out of Penistone No. 363 was assisted in rear for a short distance from the start by a 0-6-2 tank engine; up the 1 in 130-124-135 to Dunford Bridge we accelerated to 36, 43½ and 43 m.p.h., running the six miles from Penistone start in 11¾ min., 10¾ min., and 10 min. 55 sec. The 3.2 miles through the tunnel to Woodhead were threaded in 4 min., 3 min. 40 sec. and 3¾ min. Nothing like the possible speeds were, of course, attempted down to Guide Bridge, although we did reach 71½ m.p.h. on the second trip; on the first we did not exceed 67, nor on the third 66 m.p.h. Each train slackened carefully to 40 m.p.h. over Dinting Viaduct and also reduced speed through Godley Junction, the times for the 14.2 miles from Woodhead to Guide Bridge being 16¾ min., 16 min. 40 sec. and 17 min. Total times from Penistone to Guide Bridge were thus 32½ min., 31 min. 5 sec. and 31 min. 40 sec., schedule time being 34 min. No. 363, which being unpiloted deserves the chief honours, would have covered the distance in 31½ min., but for signal delays outside Guide Bridge. The pilots were dropped at this point, and No. 363 ran on to Manchester Central, 11.1 miles, in 16 min. 20 sec.; No. 1092 took 16 min. 35 sec., and No. 192, 17 min. 10 sec., schedule being 17 min.

In the reverse direction a competition between an "Atlantic" and one of the

Digitized by Google

large rebuilt and superheated 4-4-0's makes an interesting study. The former was No. 266, and had a seven-coach train of 240 tons total weight, while the latter, No. 1028, was hauling a six-coach 210-ton train. Times of 9 min. 40 and 30 sec. were taken over the five miles from London Road to Guide Bridge. From there the first mile starts at 1 in 73-108-97, but then the grade eases to 1 in 185-143 to Godley, 462 to Mottram, 122 to Dinting Viaduct, and 1 in 100-117 continuously from Dinting for 7½ miles to Woodhead. The three miles through the tunnel are up at 1 in 200. Both trains were slackened for p.w.r. operations beyond Godley, but we passed that station, 3.3 miles, in 6 min. 35 sec. and 7 min., Dinting, 6.9 miles, in 12 min. 50 sec., and 13 min. 20 sec.; and Woodhead, 14.2 miles, in 24 min. 55 sec. and 26 min. 25 sec. Sustained rates on the 1 in 100 beyond Hadfield were 35 and 33 m.p.h., and on the final 1 in 117, 37½ and 34½ m.p.h. Woodhead to Dunford took 4 min. 55 sec. and 5 min. 40 sec., and Dunford down to Penistone, 7 min. 35 and 20 sec.—total 37 min. 25 sec. and 39 min. 25 sec. for the 23.4 miles from Guide Bridge. Thus the "Atlantic" had distinctly the best of it, and with a heavier load, although, truth to tell, I have seldom found the rebuilt 4-4-0's anywhere near the "Director" class in the way of performance. Schedule for the last mentioned length is 38 min. No. 266 got signals on badly between Penistone and Sheffield, while No. 1028 ran the 12.9 miles in 14 min. 55 sec., touching 68 m.p.h., but frequently applying the brakes. Schedule in this case is 17 min.

Out of Sheffield I am including a third run on the same train, the engine in this case being "Atlantic," No. 1088, with a seven-coach train of 250 tons. We passed Woodhouse, five miles, in 8 min. 15, 15 and 20 sec., slacking slightly over the junction in each case, and Staveley, 12 miles, in 15 min. 55 sec., 16¾ min. and 16 min. 50 sec. The eight miles' ascent thence to Pilsley, of which the first four are at 1 in 100, occupied 12 min. 35 sec., 14½ min and 12 min. 20 sec., sustained speeds on the 1 in 100 being 33, 32 and 34 m.p.h. From Pilsley to Kirkby South Junction the 7.1 miles took 8¼, 8¼ and 7¾ min., while the 9.2

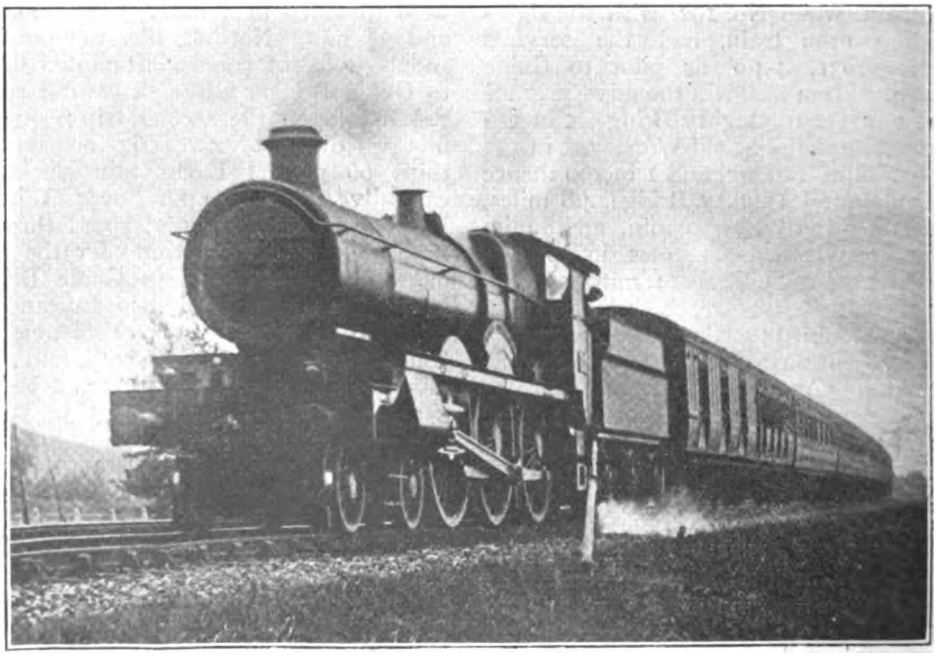


Photo.] GREAT WESTERN RAILWAY. [*W. Rich.*

Plymouth-Paddington express. 4-6-0 locomotive, No. 2914, "Saint Augustine."

Digitized by Google

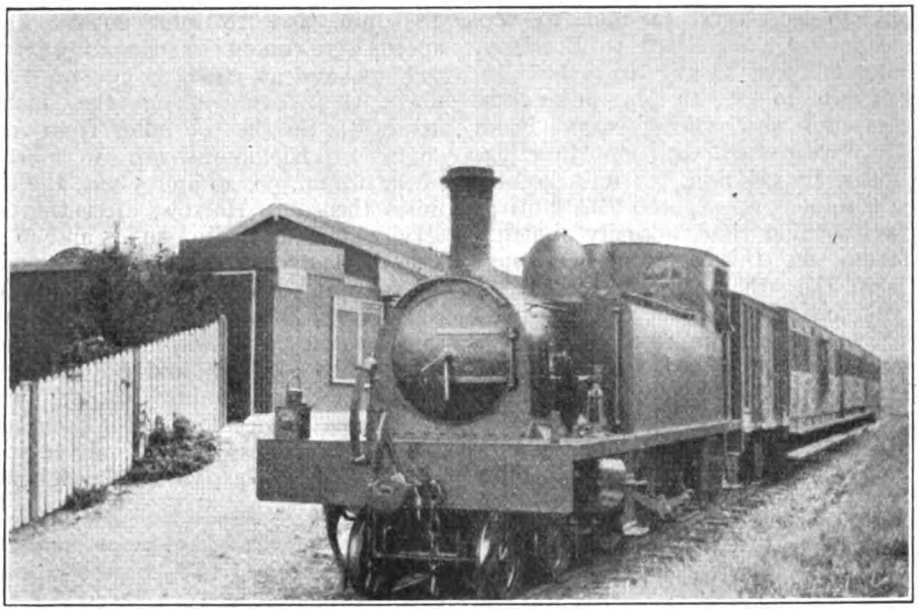


Photo.] **COUNTY DONEGAL JOINT COMMITTEE'S RAILWAY.** [*W. P. Sefton.*

Train at Rossnowlagh Station. 4-6-2 tank engine, "Inver."

miles on to Basford occupied 9 min. 25 sec., 8 min. 55 sec. and 9¼ min. No. 1028 reached 72½ m.p.h. on this section, and No. 1088, which was slacked for relaying operations at Kirkby South Junction, as much as 74 m.p.h. beyond Hucknall. All three trains encountered adverse signals between Basford and Nottingham, this 1·6 miles consuming 3 min. 20 sec., 2 min. 55 sec. and 3 min. 20 sec., but for all that the total times from Sheffield were only 49½ min., 50 min. 20 sec. and 49 min. 20 sec. Net times were about 48¾, 50 and 47½ min., against a schedule of 51 min. Additions of fish wagons to the trains at Nottingham on the first and second runs brought the total loads up to 280 and 240 tons respectively, but the 260-ton load on the third run was not increased. Ruddington, 4.4 miles, was passed in 6½ min. on each run, Loughborough, 13.6 miles, in 16½ min., 16¼ min. and 15 min. 50 sec., and Leicester, 23.4 miles, was reached in 27 min. 35 sec., 26¾ min. and 26 min. 25 sec., schedule being 27 min. No. 1028 fell to 50 m.p.h. at Barnston, but touched 70½ at Loughborough, and never went below 54 at Belgrave—a good performance—while No. 1088's corresponding speeds were 53½, 70½ and 54½ m.p.h., which was still better.

At Leicester on the first run we changed our engine for "Director" 4-4-0, No. 434, *Edwin A. Beazley*; on the second for No. 433, *Walter Burgh Gair*, and on the third for an "Atlantic," whose number I forgot to note. On the first run we sustained 50 m.p.h. on the 1 in 176 of Ashby bank, touched 75 before Rugby, entered Catesby Tunnel at 42 m.p.h., and left it at 39, and made Woodford, 34 miles, in 39 min. 25 sec., Rugby having been passed in 22¾ min. Schedule to Woodford is now 41 min., and with 280 tons this was not a bad performance. No. 433 was dead stopped for signals at Ashby, and so took 28 min. 5 sec. to Rugby, but the ascent of Catesby bank was good, the lowest speed at Charwelton being 43 m.p.h. So Woodford was reached in 44 min. 25 sec. The "Atlantic" did badly to Rugby, but excellently thereafter; on Ashby bank we could not get above 41½ m.p.h., nor did we exceed 70½ before Rugby, so taking 26½ min. to that place. But by entering Catesby Tunnel at 47½ m.p.h. and leaving

Digitized by Google

it at 44½, we reached Woodford in another 15 min. 40 sec.—total 42 min. 10 sec. from Leicester. Woodford to Brackley, 9.8 miles (allowed 14 min. to restarting), took 13 min. 20 sec., 12 min. 50 sec. and 13 min. 20 sec. start-to-stop. From Brackley we passed Grendon Junction, 12.5 miles, in 13½ min., 13 min. 40 sec. and 14 min. 50 sec., the "Atlantic," now well behind time, actually shutting off steam on this length. Maximum speeds in the other two cases were 74 and 72½ m.p.h. Aylesbury, 21.3 miles, was passed in 22½ min., 22 min. 50 sec. and 24 min. 20 sec., after the customary slack at Quainton Road Junction, and on the first two runs an additional severe p.w.r. check followed at Stoke Mandeville. So the 14.4 miles from Aylesbury up to Amersham occupied 17¾ min., 18¾ min. and 18 min. 20 sec. High speeds were run on the succeeding descent, 71½, 75, and as much as 79—my record down this bank—being the maxima attained. So the 6.4 miles from Amersham to Rickmansworth were reeled off in 6 min., 30, 20 and 5 sec., the eight miles thence to Harrow, after the usual service slack, in 9 min., 50, 45 and 40 sec., and the last 9.2 miles into the terminus in 11 min., 20, 20 and 10 sec. Total times from Brackley, 59.3 miles, were thus 67 min 55 sec., 69 min. and 69 min. 35 sec., or 66½ ,67½ and 69½ min. net, schedule being 69 min. No. 434, which despite the heaviest load of the three, made all the best times, was the only engine to effect a punctual arrival at Marylebone.

MOTOR TRANSPORT UP-TO-DATE.

"THE NEW COMPETITOR."

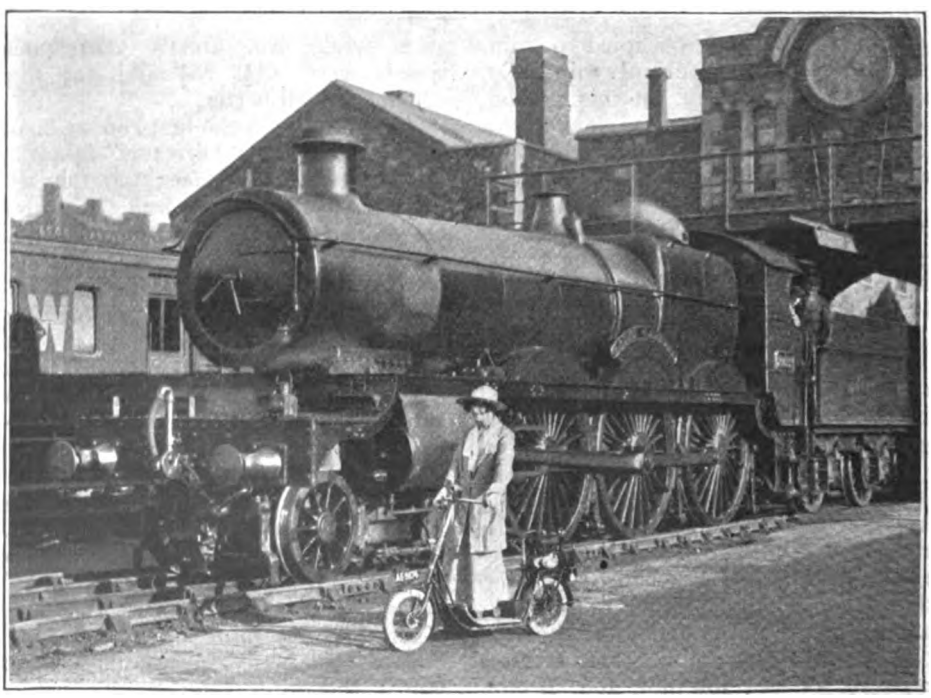
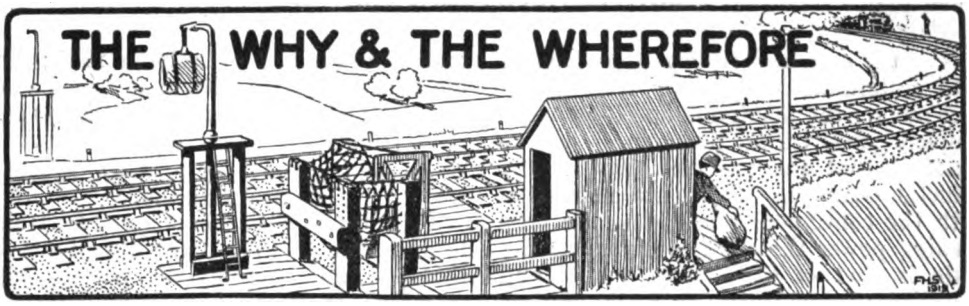


Photo.] [*Harold Solomon.*

AN ESSENTIALLY MODERN MOTIVE-POWER COMPARISON.

Digitized by Google



RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, 30, *Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like, readers should consult the pages of the "Railway Year Book," for the current year. Price* 5s. *By post* 5s. 6d. *Abroad* 5s. 8d.

Pre-War Highest Speeds on Railways.

Before the war the Northern Railway of France had an express booked from Paris to St. Quentin, 95·7 miles, in 94 minutes, so that the newspaper extract you send is not so far out in giving the distance as 96 miles in 93 minutes. Onwards to Erquelines the allowance was 55 minutes for 53·4 miles, giving an inclusive average for 149·1 miles from Paris to Erquelines of 59·22 m.p.h. Contemporary with this our own North Eastern train was scheduled to cover the 44·3 miles from Darlington to York in 43 minutes, average 61·7 m.p.h.; while the Great Central Railway ran the 2.30 a.m. newspaper express from Marylebone between Rugby and Leicester at an average rate of 61·3 m.p.h. Both England and France have had other schedules exceeding the mile-a-minute rate in the past, but these were, we believe, the only ones applying in 1914.

[Reply to MONSIGNOR PROVOST BROWN.]

Electric Rolling-Stock, North London Railway.

In view of the fact that the North London Railway is now operated on behalf of the proprietors by the London and North Western Railway, and electric trains so far introduced consist of North Western stock, it is probable that the same principle will apply when electric traction is inaugurated via Chalk Farm. Presumably, too, the Bow and Poplar branch will eventually be electrified, though as that is purely North London traffic the same factors do not apply; while in the case of the through trains to the Great Northern Railway the situation is again different in that these services are worked on behalf of the Great Northern Railway, and at present there are no suggestions for electrifying any of their lines.

[Reply to H. V.]

Locomotive Sheds, London and North Western Railway.

There are 38 sheds to which numbers are allotted. The list of sub-sheds is too lengthy for inclusion, but the following are the main sheds:—1 Camden, 2 Willesden, 3 Bletchley, 4 Nuneaton, 5 Northampton, 6 Bescot, 7 Netherfield and Colwick, 8 Rugby, 9 Walsall, 10 Aston (Birmingham), 12 Burton, 13 Bushbury, 14 Stafford, 15 Crewe, 16 Longsight, 17 Farnley and Wortley, 18 Birkenhead, 19 Chester, 20 Huddersfield, 21 Bangor, 22 Holyhead, 23 Warrington, 24 Peasley Cross, 25 Springs Branch (Wigan), 26 Edge Hill, 27 Preston, 28 Tebay, 29 Carlisle, 30 Salop, 31 Abergavenny, 32 Workington, 33 Swansea, 34 Patricroft, 35 Speke Junction, 37 Mold Junction, 38 Llandudno Junction. Nos. 11 and 36 are blank.

[Reply to E. A. KNAPPETT.]

Effect of Couplings on Speed.

In themselves the different forms of coupling used between vehicles would have little or no effect on the speed of trains. Compression of the couplings of a long loose-coupled goods train at the moment of stoppage, of course, makes starting a considerably easier matter than

Digitized by Google

it is in the case of a train rigidly coupled with automatic couplings. The limitation put on the maximum speed of loose-coupled goods trains, however, is due to the fact that the vast majority of the vehicles composing them are not fitted with the continuous brake, and the only braking power therefore available on the train is that of the engine, tender and guard's brake, when the train is in motion.

[Reply to "SEEPEEAAR."]

Shap Incline, London and North Western Railway.

Banking engines are used regularly on this incline, a number of the 4-6-2 superheater tanks being stationed at Tebay for this purpose. With very heavy loads express trains are also at times piloted from Oxenholme through to Carlisle. In both these cases special stops are necessary, either at Oxenholme or Tebay; but in the case of the run you mention the train was run through from Crewe to Carlisle without intermediate stoppage or pilot assistance. We have no details concerning the non-stop run of the 3-cylinder compound *Ionic* between London and Carlisle in 1895, beyond the bare fact that the run was made.

[Reply to WM. T. HOECKER.]

Midland Railway Locomotive Classification.

We cannot afford the space to detail the classification of all the 0-6-0 engines of this company; considerable complications have arisen owing to engines in one class having been re-built with larger boilers and raised to a higher classification. The bulk of the engines between 2300 and 2867 belong to Class 1; between 2900 and 3834 the engines are fairly evenly divided between Classes 2 and 3; at 3835 the superheater engines begin, and these are in Class 4. We have no information as to the ultimate number of the last-mentioned type likely to be built.

[Reply to "DERBY."]

Hemel Hempstead Railway.

Incorporated in 1863, powers were obtained to construct a line from Boxmoor, London and North Western Railway, via Hemel Hempstead and Redbourn to Harpenden, these connecting with both the Midland and the Great Northern lines. In 1877 the section from Harpenden to Hemel Hempstead was opened for traffic and worked by the Midland Railway, who took over the line entirely in 1886; but the section between Boxmoor and Hemel Hempstead was never brought into use.

[Reply to "WEST KENSINGTON."]

Grendon Underwood Junction, Great Central Railway.

There is no restriction of speed for trains to and from the Wycombe direction over this junction, the lay-out having been arranged to give a straight run for Wycombe line trains when the latter route was constructed. We do not understand the remainder of your question; obviously the usual reductions of speed prescribed over facing junctions are for the *diverging* lines. Trains to and from the Aylesbury direction are restricted nominally to 35 m.p.h.

[Reply to S.C.P.]

Performance on the London, Brighton and South Coast, and South Eastern and Chatham Railways.

This subject has been dealt with at considerable length by Mr. Cecil J. Allen in "British Locomotive Practice and Performance" on a number of occasions, principal among which we may mention: Both companies, October, 1912, and November, 1913; also London, Brighton and South Coast Railway in September and October, 1915, and South Eastern and Chatham Railway in November of the same year.

[Reply to C. G. KENNELL.]

Locomotive Working Drawings.

We do not publish working drawings of locomotives, which presumably you refer to when mentioning "detailed plans." A coloured plate and leading dimensions of the 0-6-2 Great Eastern Railway superheater tank No. 1001, was given with the June, 1915, RAILWAY MAGAZINE. A large photograph and principal dimensions of the same company's 4-6-0 express engine, No. 1500, were given with the March, 1912, issue.

[Reply to "G.E.R. ILFORD."]

2-4-0 Tank Engines, London and North Western Railway.

In a reply under this heading in May we omitted to mention the small engines built with this wheel arrangement in the years 1876 and 1877. Mr. C. Williams informs us that all the 10 engines of this type are still at work, mostly on the Cromford and High Peak line in Derbyshire; he also writes that five engines

Digitized by Google

only were converted by Mr. Whale from the 2-4-2 to the 2-4-0 wheel arrangement, this taking place in 1908.

[Further reply to " L.N.W.R.]

" Insulated " Vans.

Insulated vans are employed for perishable traffic of minor importance, *i.e.*, that which does not require to be kept in a state of actual refrigeration. For the latter special refrigerator vans are used, but the insulated vans are simply lined internally with a non-conducting material in order to afford some protection to the contents from the heat of the sun, and to keep them at an even temperature.

(Reply to E. E. C.]

The Wootten Firebox.

You can distinguish a Wootten firebox easily by the fact that it spreads out at the base on either side almost to the extreme width of the engine, and rests on the main frames, instead of being narrowed at the base in order to fit between the frames. This characteristic feature is clearly apparent in the " Atlantic " express engines of the Great Northern and London, Brighton and South Coast Railways.

[Reply to H. W. OGG.]

London, Brighton and South Coast Railway Mile-Posts.

Mile-posts on the joint London, Brighton and South Coast and London and South Western line between Epsom and Leatherhead Junction are numbered from Waterloo, and the same numbering, strangely enough, is continued over the London, Brighton and South Coast Railway to Horsham. Your second query is not of a type we undertake to answer, as it is of no general interest.

[Reply to " 443."]

Belpaire Fire-boxes on the London and North Western Railway.

Two of the Webb 4-4-0 4-cylinder compounds, No. 1929, *Polyphemus*, and No. 1930, *Ramillies*, were rebuilt by Mr. Whale, with Belpaire fire-boxes as an experiment. The former still retains this fire-box, but the latter has since been rebuilt for a second time and converted to a 2-cylinder simple engine of the " Renown " class.

[Reply to " CROXTETH."]

Rebuilt Locomotives, London, Brighton and South Coast Railway.

We can only consider that the terms " rebuilt " and " reboilered," which you have noted on similar locomotives, have their correct meanings, that in the one case the engine has received more extensive attention, involving many other parts than the new boiler, while in the other the boiler is the only essentially new part, though a new chimney and certain other details may go with it.

[Reply to E. F. B.]

Applying Continuous Brakes.

In applying the vacuum brake the cock allowing air to enter the train pipe is not left open continuously, as this would probably have the effect of locking the wheels and causing them to skid. Trains are always stopped by a series of partial applications of the brake, and a corresponding method is adopted, of course, in the case of the Westinghouse brake.

[Reply to W. S. UPTON.]

4-4-0 Midland Engine No. 319.

We are indebted to Mr. Chas. F. Coville, of Millhouses, Sheffield, for information to the effect that above engine, concerning which you made enquiry, was until recently stationed at Millhouses shed, but was then transferred to Grimesthorpe, from which she worked the nightly fish train to Birmingham; she has now been returned to Millhouses.

(Further reply to A. E. WOOD.]

Some Great Eastern Railway Queries.

Total length of the main platform at Cambridge is 1,375 ft. Water-troughs are situated on the Ipswich main line of the Great Eastern Railway at Halifax Junction, between Bentley and Ipswich, and also between Burston and Tivetshall, on the Ipswich-Norwich section. You can obtain all information of this character from the RAILWAY YEAR BOOK.

[Reply to C. S. ORPEN.]

London and South Western Railway Electrification.

Tank locomotives set free by this company's suburban electrification have for the most part been sent to outlying and country districts in order to replace early 4-4-2 tank and 4-4-0 and 0-4-2 tender engines, but we have no details as to the number of 0-4-4 tank engines thus transferred, or of the three last-mentioned classes withdrawn from service in consequence.

[Reply to J. D. THOMSON.]

Digitized by Google

Railways at Cromer.

No railway crosses the Midland and Great Northern Joint Railway in the Cromer neighbourhood. Doubtless you refer to the bridge carrying the Great Eastern Cromer main line (between Cromer Junction and Cromer) over the Norfolk and Suffolk Joint (Great Eastern and Midland and Great Northern) line from Cromer to Mundesley, between Roughton Road Junction and Overstrand.

[Reply to "C. P. R."]

4-6-0 Engines, London and South Western Railway.

In our reply to "Surbitonian," in the April issue, it was our intention to indicate that the 6 ft. 4-6-0 engines of this railway are confined mainly to the goods service. The 6 ft. 7 in. engines of the "443" series, although a number of them have recently been in the shops, are now being returned to express passenger duty.

[Reply to J. D. THOMSON.]

The Heaviest 4-4-0 Express Engine.

This distinction is enjoyed by the superheater 4-4-0 "137" series on the Glasgow and South Western Railway, designed by Mr. P. Drummond. These engines weigh 63¼ tons in working order without tenders. The London, Brighton and South Coast Railway has no very large 4-4-0 engines in service, the heaviest weighing only 49 tons in working order.

[Reply to H. D. N. S.]

Great Western Railway Birkenhead Restaurant Cars.

The luncheon car on the 10.15 a.m. from Paddington to Birkenhead now runs right through, instead of coming off at Shrewsbury, as previously. This is the balancing working to the 11.40 a.m. from Birkenhead to London, two cars and crews, of course, being required to maintain the service.

[Reply to "BOLTONIAN."]

Numbering Locomotive Tenders.

Several companies, including the London and North Western Railway, number their tenders in a series separate from that of the engines. The low numbers of new tenders to which you refer would result from the numbers of early tenders which have been broken up being allocated to tenders recently rebuilt.

[Reply to "CROXTETH."]

"Riviera" Stock, Great Western Railway.

The so-called "Riviera" stock is subject to the same restrictions of use over certain sections of the Great Western Railway as all the 70-ft. coaches of that company. We cannot afford the space for detailing all the restricted sections, but as regards the North, the stock in question may be run through to Birkenhead.

[Reply to J. A. O. FARNELL.]

South Eastern and Chatham Railway Train Services.

We cannot say whether or when services between Beckenham Junction and Norwood Junction, and from Ludgate Hill to Moorgate Street, will be restored. Probably trains will again run from Beckenham Junction to Crystal Palace when the "Victory" Exhibition is opened in June.

[Reply to J. L. PEARSE.]

2-8-0 R.O.D. Locomotives.

We believe that the above engines are only considered in the nature of a "loan" to the companies which have taken them over; consequently the old R.O.D. numbers are still retained, and these engines are not included in the returns of the companies concerned.

[Reply to J. H. SUTCLIFF.]

Dunstable Traffic, Great Northern Railway.

Great Northern trains run to Dunstable (London and North Western Railway) by virtue of running powers, hence the tickets you refer to are issued from a London and North Western station but for journeys which are only provided for by Great Northern trains.

[Reply to H. V.]

Colours of Great Western Railway Coaching Stock.

It was in 1908 that the change from the previous chocolate and cream livery to the present crimson lake was decided upon. The Great Eastern Railway last year decided upon a change from varnished teak to crimson lake, which is now in course of being carried into effect.

[Reply to J. A. O. FARNELL.]

Letters and Numerals on Coaching Sets.

Several railways now place large letters and numerals on set trains used for suburban services, the letters usually indicating their stabling centre and the numerals identifying the various sets of vehicles, both enabling the movements of vehicles to be organised and recorded.

[Reply to J. L. PEARSE.]

G.N.R. 2-6-0 Locomotive No. 1000.

The shelter you noted erected around the front of this engine is used when

Digitized by Google

taking indicator diagrams and conducting experimental investigations as usual with engines of a new design. It gives protection to the men in charge of the special appliances fitted for the purpose.

[Reply to C. STEVENSON.]

Non-Smoking Compartments, South Eastern and Chatham Railway.

The diagrams reproduced on page 282 of the April RAILWAY MAGAZINE apply to representative sets of coaches, and were based upon official material. Your sketches are probably correct for certain sets varying from the diagrams given.

[Reply to H. W. POINTER.]

Bournemouth-Birkenhead Expresses, London and South Western Railway.

Between Bournemouth and Oxford these trains are usually hauled by superheated Drummond 4-4-0 engines of the "463" series. On both London and South Western and Great Western systems they are subject to the usual speed restrictions.

[Reply to "SOUTH WESTERN."]

Slip Coaches, Great Western Railway.

By "long black tube" we presume you refer to the reserve vacuum cylinders fixed on the roofs of the earlier Great Western Railway slip brake coaches, on either side of the clerestory. These furnish a reserve of brake power to assist the slip guard in pulling up the slip portion after it has been detached. [Reply to J. G. C.]

Locomotive Tractive Effort.

We have dealt with this matter on a number of occasions. See RAILWAY MAGAZINE, July, 1918, page 47, and August, 1918, page 125. "Tractive effort" is merely a nominal indication of the power of a locomotive calculated from its leading dimensions. [Reply to "TREFUSIS."]

Duplicate Numbering of London and South Western Engines.

Underlining the old number is the present method of indicating duplicate London and South Western Railway locomotives. At the time of writing we have no information on your second query; the third transgresses the rules.

[Reply to F. H. SMEE.]

The Royal Train.

It is only possible to secure a satisfactory photograph of the Royal train by obtaining the permission of the company over whose line it is running to use a camera at some suitable point *en route*.

[Reply F. J. RAYBOULD.]

Colours of American Coaches.

It has often been the practice in America and Canada to paint the coaches of "crack" express trains in various colours, apart entirely from the general practice of the railway concerned, and this was doubtless done in the case to which you refer. [Reply to "C. P. R."]

Locomotive Workings, London and North Western Railway.

In the ordinary course, engines work through between both Euston and Liverpool and Euston and Manchester on certain trains, but the engine crews are generally changed *en route*.

[Reply to R. W. HANBIDGE.]

"1000" Class, Midland Railway.

As these engines are three-cylinder compounds obviously they must have two cylinders outside, these being low-pressure and operating in conjunction with one high-pressure cylinder between the frames.

[Reply to J. W. W.]

Manchester via Stoke.

Obviously a train which is booked to call at Stafford must travel via Norton Bridge, though most of these expresses diverge from or join the London and North Western Railway main line at Colwich.

[Reply to C. E. F. JONES.]

4-4-0 Engines, South Eastern and Chatham Railway.

We have no information as to the future intentions of Mr. Maunsell as regards rebuilding the "730" series of Wainwright 4-4-0 engines on this railway.

[Reply to "VOELAS."]

"The Great Bear."

We have no information as to this engine ever having worked on the north main line of the Great Western Railway, or any other section other than London-Bristol.

[Reply to "TREFUSIS."]

West Highland Railways.

Several articles dealing with this line have been published in the RAILWAY MAGAZINE, the latest being contained in the July, 1914, number.

[Reply to MONSIGNOR PROVOST BROWN.]

"498" Class, London and South Western Railway.

An engine of this new class is illustrated by the frontispiece to this number. Your good wishes are appreciated.

[Reply to H. R. L. GRAY.]

Digitized by Google

PERTINENT PARAGRAPHS

The Crystal Palace and its Railways.

It will be good news to many of our readers that the Crystal Palace, now the property of the nation, is once again to become a centre of interest, when, on June 9, His Majesty the King, accompanied by the Queen and the Chief Officers of State, will open there the Imperial War Museum and Great Victory Exhibition, a dual enterprise which will tax even the capacity of the Palace, the largest exhibition building in the world. A great programme of exhibits is being gathered together, and musical and other events will figure prominently, culminating in the revived Handel Festival on June 22, 24 and 26.

In years gone by the Crystal Palace counted for a great deal in the affairs of the Metropolitan area: exhibitions, festivals of all kinds, and special sports events drew enormous crowds, and it was a common occurrence for the resources of the London, Brighton and South Coast and S. E. & C. Railways to be fully taxed to deal with the enormous numbers of visitors. But they were never found wanting, and on special occasions notable feats of transportation were accomplished by the two companies, as, for instance, when many thousands of school children were entertained there by His Majesty the King shortly after his coronation. Both the High Level South Eastern and Chatham station and the dual "Brighton" station are fitted to deal with large numbers of passengers, and in each case fast trains were regularly operated in about 20 minutes from and to Victoria (both lines), London Bridge, Holborn Viaduct, and St. Paul's, with good services on other routes, several of which converge upon the "Brighton" station.

Under electrical conditions, though the London, Brighton and South Coast Railway has not yet been able to make a commencement with equipment of the London Bridge route *via* Forest Hill, that company is now even better able to deal with heavy traffic demands as they arise, both from Victoria and from London Bridge *via* Peckham Rye and Tulse Hill. The electric trains can cover the route very smartly, and as no time is lost terminally, they can be kept in full service while the pressure lasts. There is also the steam route from London Bridge *via* Forest Hill, a traffic which need not conflict in any degree with that of the electrical routes, while the South Eastern and Chatham City and Victoria services do not come together until they are clear of the main line sections. Altogether the Crystal Palace is admirably situated from the railway point of view; it has several non-conflicting routes, and the few miles which separate it from central London are rapidly covered, whether by steam or electric trains. Special train services are in course of preparation, ready for the opening of the Victory Exhibition in June, and we anticipate some interesting developments in facilities and operating methods in conjunction therewith.

4-6-0 Express Goods Locomotives, London and South Western Railway.

In the Railway Magazine, January, 1918, a line diagram was reproduced setting forth the main features and principal dimensions of a new closs of 4-6-0 engines designed for express goods traffic then being put in hand by Mr. R. W. Urie, Chief Mechanical Engineer, London and South Western Railway. In general the design is an adaptation for goods service of Mr. Urie's well-known "486" class of mixed-traffic engines, just as the "736" class is an adaptation for express passenger traffic. There are thus the three classes, generally similar, but each adapted for a particular sphere of work: "486" class, 6 ft. coupled-wheels, mixed-traffic; "736" class, 6 ft. 7 in. coupled-wheels, express passenger traffic; and "498" class, 5 ft. 7 in. coupled-wheels, express goods traffic.

Work on the last-mentioned class has been delayed from various causes incidental to the conditions which have prevailed since the Armistice; but the first engines are now in

Digitized by Google

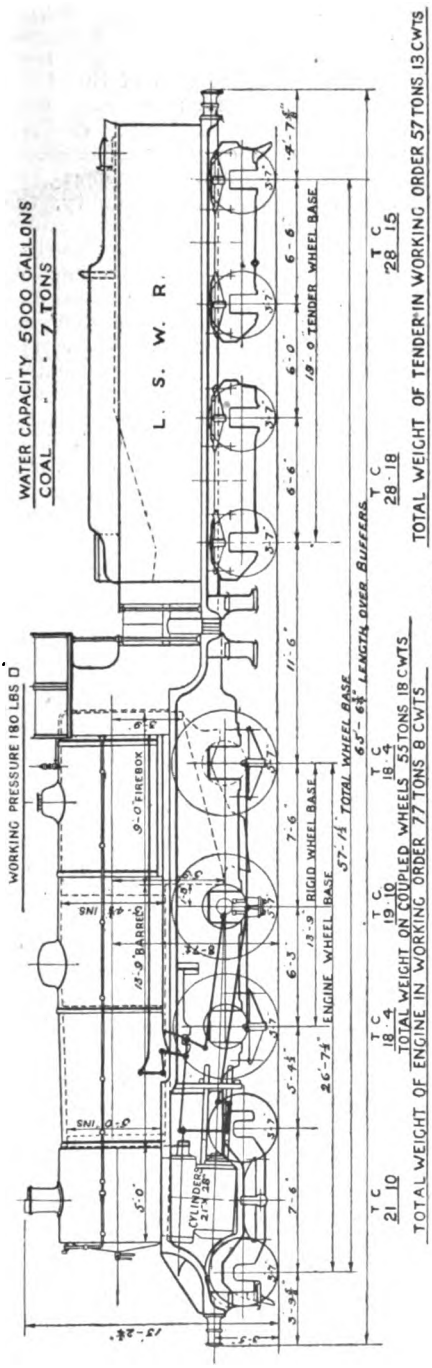


DIAGRAM OF NEW 4-6-0 GOODS LOCOMOTIVE, LONDON & SOUTH WESTERN RAILWAY.

service, and by courtesy of Mr. R. W. Urie we are now able to illustrate No. 498 as frontispiece. As will be seen, the engines are generally similar to the two companion classes, and especially to the 736 series, which include certain modifications made since the "486" class was produced in 1914. The boiler is equipped with Eastleigh superheater, and various fittings include "Detroit" four-feed hydrostatic lubricator with bulls-eye glasses, "Dreadnought" ejector, Gresham's No. 11 hot-water injectors, exhaust steam tubular water heater in the tender, a steam boiler tube cleaner connected to a steam cock on the side of the smoke-box, vacuum brake equipment and train heating fittings. Walschaert valve gear is used, operating piston valves of the company's standard design. The tender is of large capacity to permit of long distances being covered without replenishing.

Leading dimensions are :—

Cylinders	21 by 28 in.
Coupled wheels	5 ft. 7 in. diam.
Bogie wheels	3 ft. 7 in. diam.
Coupled wheel-base ..	13 ft. 9 in.
Engine wheel-base	26 ft. 7½ in.
Steam pressure	180 lb. per sq. in.
Heating surface—	
Small flue tubes	1,252 sq. ft.
Large flue tubes	464 ,,
Firebox	162 ,,
Total water surface	1,878 ,,
Superheater	308 ,,
Total..	2,186 ,,
Grate area	30 ,,
Adhesion weight	55 tons 18 cwts.
Total engine weight in working order	77 tons 8 cwts.
Tender—	
Water capacity	5,000 gal.
Coal capacity	7 tons.
Weight of train (loaded) ..	57 tons 13 cwts.
Total weight of engine and tender in working order..	135 tons 1 cwt.

Railway Statistics, January, 1920.

REFERENCE was made last month to the system of standard statistics introduced by the Ministry of Transport, but the first statistics based thereon (for the four weeks ending February 1, 1920), were not available in time for consideration then. It is now, however, possible to appraise their practical value, while definite indications are given as to the nature and volume of traffic with which our railway have to deal. Similar tables are to be issued monthly, and it will then be possible to compare the traffics of each month, and, in due course, with those of the previous year, whereas at present the figures given can only be considered on their own merits. Obviously a number of explanations are involved as to

Digitized by Google

the basis upon which the statistics are compiled; but most of these appear to be reasonable inferences, as, for instance, the use of rate-book distances for local traffic irrespective of alternative routes, allowance of bonus additions (as for the transit of special sections of line, important bridges and long tunnels), compromises to suit conditions incidental to joint ownership, running powers, &c., and the interpretations of traffic, shunting, empty and departmental mileage and user of locomotives and vehicles.

During the period named, general merchandise (including live stock) in England, Wales and Scotland (Ireland is not yet included) amounted to 5,993,541 tons, with a net ton-mileage of 552,411,019, the average length of haul being 92·17 miles. Coal, coke, and patent fuel amounted to 15,224,093 tons, 666,648,773 net ton-miles, average haul, 43·8 miles; while other minerals (4,865,014 tons, 250,299,712 net ton-miles, average haul, 51·45 miles), bring the freight totals to 26,082,648 tons, 1,469,359,504 net ton-miles, and an average haul of 56·33 miles. These figures exclude what is termed "free-hauled" traffic, that is departmental or service traffic conveyed by revenue-earning trains. Ballast and departmental trains are, of course, entirely excluded. The gross freight train receipts for 24 days are given as £7,813,284, the receipts per ton-mile being 1·276*d*. on the gross basis, the corresponding figures, less cost of collection and delivery, being £7,068,996 and 1·155*d*.

Useful Work by Engines and Wagons.

Particulars are then given of the tonnage receipts, and receipts per ton in respect of principal commodities conveyed by freight trains, followed by a long series of tables setting forth various aspects of the traffic situation, from which a few items may be extracted. During the four weeks ending February 1, 1920, the average freight train load in England, Wales and Scotland, was 132·38 tons. An interesting side-light upon the capacity of our railways is afforded by the figure of 75,626, the ton-mileage per route mile. To those who think only in terms of mile-a-minute speeds it will come as somewhat of a revelation to be told that the average number of miles per train-hour of steam-operated coaching trains is only 12·97; by electric locomotives, 10·84; by electric motor vehicles, 14·35; by rail motors, 9·47; and the general coaching average is 13·10. Per engine hour the train mileage drops to 9·56 for steam, though electric traction shows up better and so brings the average to 10·02. There is, however, some consolation in that freight traffic (steam) is down to 7·29 miles per train hour and 3·07 per engine hour, while electric freight traffic cannot do better than 8·74 miles per train hour and 4·7 miles per engine-hour. The explanation of these low figures is, of course, that train-hour and engine-hour take account of every section of the day's work and of all conditions involved, and, therefore, cover factors which do not appear when one train only is considered.

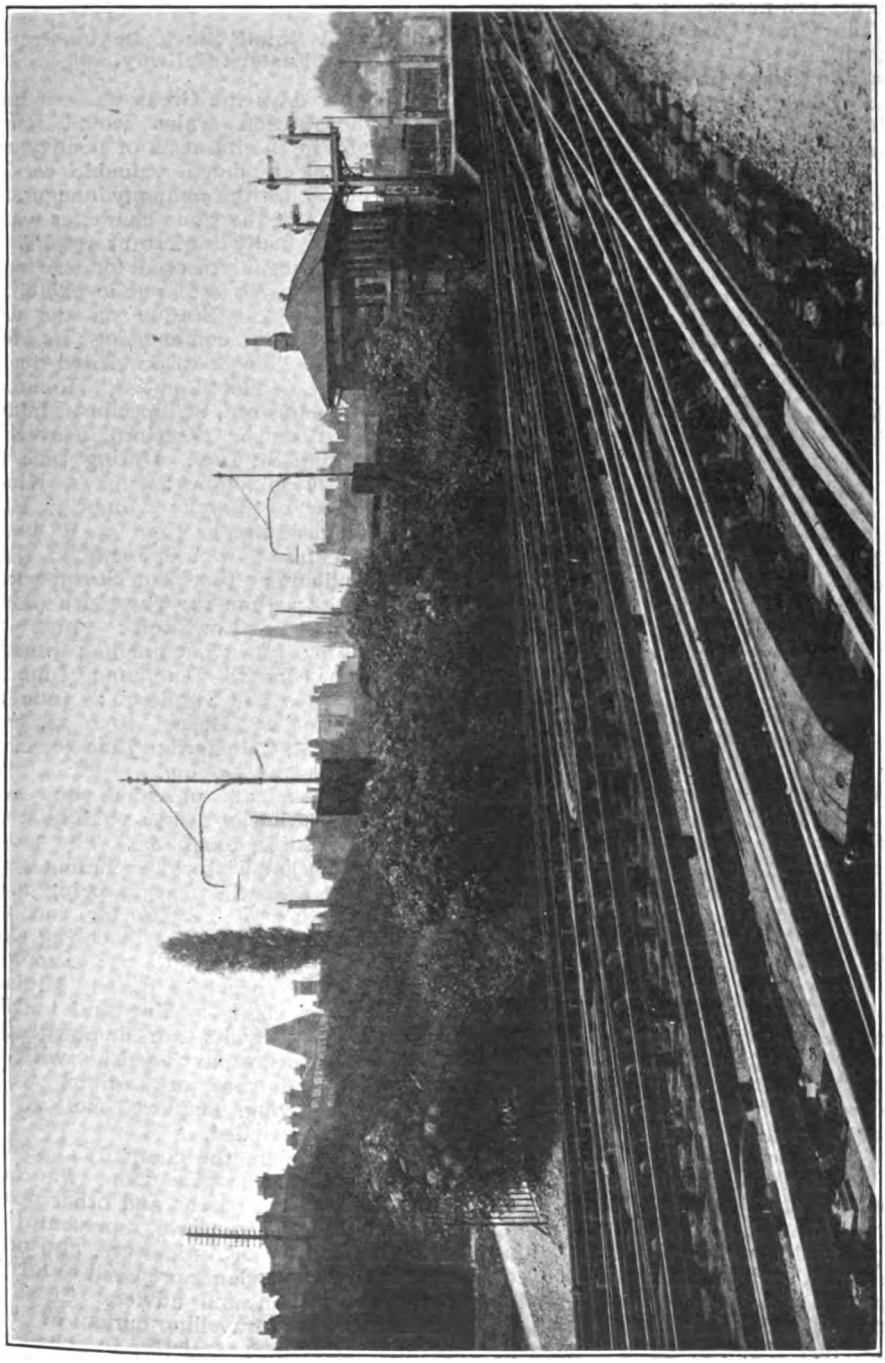
Wagon-miles amounted to 280,415,656 loaded, and 112,440,508 miles empty, the average load of 5·42 tons per wagon and a loaded ratio to total mileage of no less than 71·38 per cent. being very satisfactory indeed. An average of 34·04 wagons per train, and of 104·39 wagon-miles per engine-hour are also favourable figures. An average of 1·43 hours per day in transit, against 22·57 hours shunting, standing, under and awaiting repairs, &c., are also creditable figures which hardly support accusations of operating inefficiency in regard to railways. The average miles per wagon run each week is given as 52·11 loaded and 20·9. empty.

Coaching traffic involved 15,950,865 and freight traffic 11,540,931 miles (including empty running for traffic purposes); shunting miles were 1,239,712 coaching and 9,547,011 freight; while other traffic brings the total engine miles to 42,684,479. During the period noted, of a total of 6,267,156 engine-hours, 735,850 were occupied by engine duties, leaving 5,531,306 for working traffic.

Comparisons by Companies.

Detailed particulars of operating results for 16 principal railway companies are then given, from which several items of interest may be extracted. Total freight traffic was highest on the North Eastern Railway, realising 4,976,296 tons, closely followed, however, by 4,753,590 on the Midland, 4,715,746 on the Great Western, and 4,567,813 on the London and North Western. The Great Central takes the next highest place with 2,655,233, the Great Northern, Lancashire and Yorkshire, Caledonian and North British also reaching over 2,000,000 tons. On the Great Central the largest average freight train load is reached, 174·15 tons, the Great Northern coming next with 156·36 tons, and the North Eastern with 154·81 tons. Only two railways reach an average of 40 wagons per train, the Great Northern with 40·56, and the Great Central with 40·31. The Great Northern leads with 146·46 wagon-miles per engine-hour, followed by the Midland with 130·85, and the Great Eastern with 128·82. The Great Northern also records the high ton-mileage per engine hour of 549·49, though the Midland (498·98),

Digitized by Google



EALING BROADWAY STATION, METROPOLITAN DISTRICT RAILWAY, SHOWING BANKS COVERED WITH SHRUBS PLANTED TO IMPROVE THE VIEW. (See page 416.)

Digitized by Google

and North Eastern (481·61), are not very far behind. The Midland, however, realises the highest ton-mileage per route-mile, 162,260, the Great Central coming next with 138,126.

In regard to freight train miles per train-hour the London and South Western reaches the remarkable figure of 16·28; but per engine-hour the Glasgow and South Western is highest with 4·17. Coaching train-miles per train-hour are also highest on the London and South Western, 22·91, the per engine-hour figure for that line being 11·26. The Glasgow and South Western obtains the largest percentage of loaded to total wagon-miles, 78·75, closely followed, however, by the Caledonian with 78·64. Total engine-miles reach the figure of 5,499,785 on the Great Western, though the London and North Western and Midland also exceeds 5,000,000. Engine mileage for coaching traffic was greatest on the Great Western (1,870,649), and the London and North Western (1,840,486); but on the freight side the Midland leads with 1,870,575, followed by the Great Western with 1,612,680. Engine-hours were highest on the Great Western (844,074), that company also showing a ratio of 183·51 freight, shunting, and "other" miles per 100 train miles, although on the coaching side the North Staffordshire gives the highest figure of 13.

Arboriculture on the Metropolitan District Railway.

An aspect of permanent way work, which is not usually realised, was mentioned by Mr. A. R. Cooper, assistant manager and engineer for maintenance and construction, Metropolitan District and associated railways, in the course of an address given recently before the Permanent Way Institution: the attention which has to be given to trees and shrubs on banks and in cuttings. These also have their æsthetic side. On the District Railway a start was made in 1909 by planting shrubs and bushes along the banks, and this policy has been continued ever since. This planting of shrubs has the result of strengthening the slopes as well as beautifying them, the latter effect being of benefit to both the public and the staff. A view on page 415 shows what has been done at Ealing Broadway, whilst much the same thing has been carried out on the banks between Knaresborough Road and Cromwell Road, almost in the heart of London. In 1918 there was a further development, connected partly with the scheme of allotments, when the company planted a number of fruit trees, which should add considerably to the beauty and interest of the slopes. In this connection a nursery was started in order to meet future requirements in this direction.

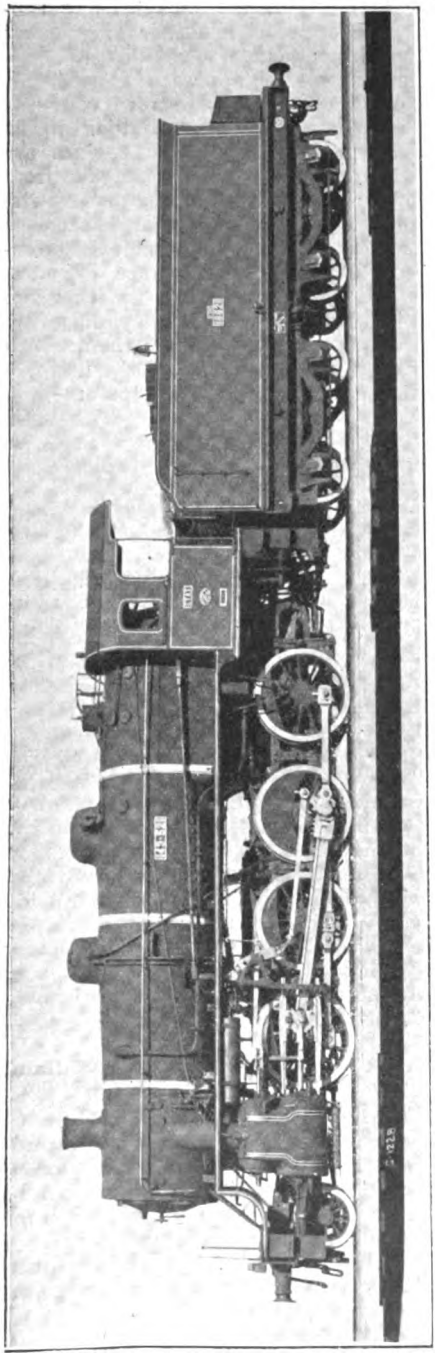
Poultry and Small Stock Demonstration Train, Great Eastern Railway.

In pre-war days the Great Eastern Railway demonstration trains which toured East Anglia in the interests of poultry and dairy farming rendered valuable service, and on May 17 last the company inaugurated a new scheme of the same character which should have equally important results. A set of three cars is reserved for the train, which was open for free public exhibition at Liverpool Street Station on the date mentioned, before commencing its tour of the system. Places to be visited during May include Clacton-on-Sea, Romford, Southend, Chelmsford, St. Botolph's Malden, Braintree, Bishop's Stortford, Haverhill, Cambridge and St. Ives. During June the programme is as follows: June 1, King's Lynn; June 2, March; June 3, Ely; June 4, Hunstanton; June 5, Wisbech; June 7, Wickford; June 8, Ipswich; June 9, Saxmundham; June 10, Stowmarket; June 11, Diss; June 12, Yarmouth (South Town) June 14, Lowestoft; June 15, Framlingham; June 16, Reepham; June 17, Fakenham; June 18, Dereham; June 19, Norwich; June 21, Swaffham; June 22, Watton; June 23, Bury; June 24, Sudbury; June 25, Chingford; June 26, Hertford; and June 28, Epping.

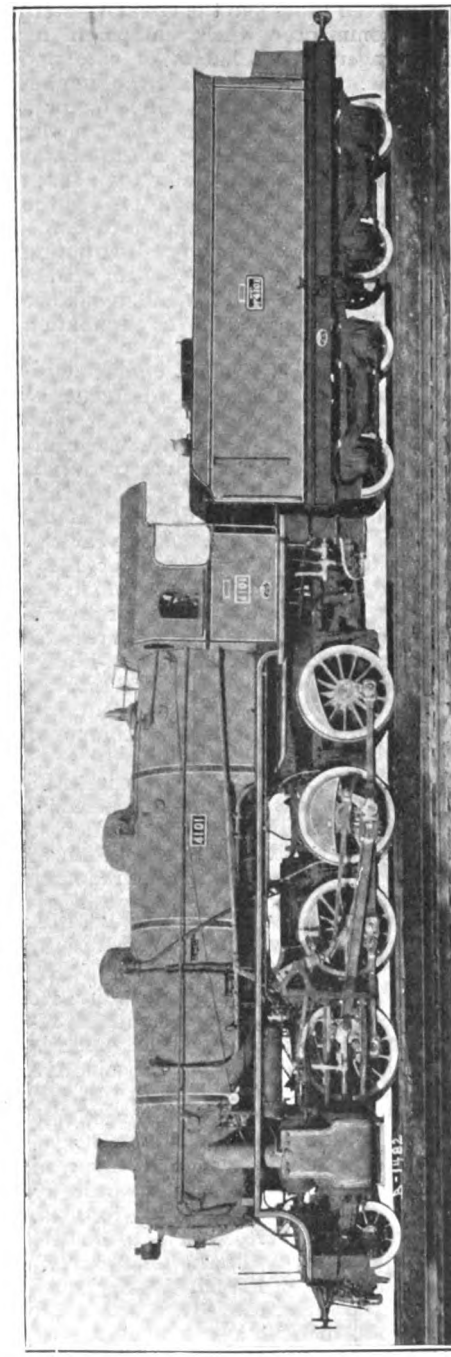
Of the three cars provided, one contains an exhibition of utility poultry stock, poultry appliances, foods, &c. The second is devoted to small stock, including goats and rabbits, a special feature being made of the breeding of rabbits for fur, and demonstrations being given of curing skins for the market. The third car accommodates an exhibit provided by the Ministry of Agriculture, cheese-making and bottling and canning of fruits are demonstrated, while a horticultural section deals with the cultivation and care of various fruits, protective spraying, manures, &c. A bee section is also included.

Mr. J. N. Leigh, the company's poultry expert, Mr. Duncan Anderson, the farm manager, Mr. Tom Barron and other people of note in the poultry world, representatives from the Ministry of Agriculture, and other experts are in attendance prepared to furnish every information and advice. In short, the train forms a travelling bureau of information. It differs entirely in character from any previous demonstration train, and should prove of great interest. The exhibition is opened each day at 1.0 p.m., and closes at 8.0 p.m. No charge is made for admission.

Digitized by Google



AMERICAN 2-8-0 LOCOMOTIVE BUILT FOR THE FRENCH STATE RAILWAYS.



AMERICAN 2-8-0 LOCOMOTIVE BUILT FOR THE MIDI RAILWAY OF FRANCE. (See page 418.)

Digitized by Google

"Safety First" on the Great Western Railway.

Nearly seven years ago the Great Western Railway commenced their campaign for the encouragement of habits of care and watchfulness. Up to that time the number of personal injuries to the staff had, for a long time past, soared higher and higher every year. Indeed, in 1913, the total was more than 120 per cent. greater than seven years before. In August of 1913 the "Safety" movement was inaugurated, followed later by the company distributing to each of their 80,000 employees an attractive book which appealed for the avoidance of dangerous practices and for the elimination of recklessness and risk.

Good results from these efforts were quickly manifest. The upward tendency in the number of accidents was not only arrested, but the first year after the campaign began witnessed a decrease of over a hundred. Steadily but surely, since that turning point, the number of personal injuries has continued to fall. Last year the number, as compared with that for 1913, showed the substantial decrease of 1,225. Many of the injuries sustained by railwaymen are slight. In the official figures the casualties are only divided into "non-fatal" and "fatal." There was a decrease of 15 in the number of fatal accidents to Great Western men last year, as compared with the previous year.

If, as would seem to be the case, the prevention of upwards of a thousand personal injuries in a year is a result of the "Safety" campaign, there could be no better form of encouragement to all concerned to redouble their efforts in this direction.

American Locomotives for French Railways.

On the previous page illustrations are reproduced showing 2-8-0 locomotives recently supplied by the American Locomotive Company through the American Locomotive Sales Corporation, 26, Victoria Street, Westminster, London, S.W.1, respectively to the French State and Midi Railways. Design in each case is based upon American practice, modified to suit French railway methods in respect of fittings and fixtures. All the dimensions were worked to on the metric system, with international screw-threads and the French-Westinghouse system of pipe threads. The boiler, in general, is of American type, an increased grate area being obtained by the use of a short wide fire-box. A dumping grate in the front of the fire-box is operated from the cab by a screw, whilst the fire door opens inside as required by French law. The outside end of the blow-off cock has a special thread to permit of its being connected up to the fire hydrants of the City of Paris. Boiler lagging is omitted, the jacket being supported on a crinoline frame, leaving an air space which acts as a non-conductor.

Pneumatic sanding apparatus is used, this being combined with a screw conveyor which extends through the sandbox and is operated from the cab. The engines are fitted with a variable exhaust, worked from the cab by a screw which passes through the handrail. Spark-arresting apparatus is fitted, and other equipment includes cross-balanced driving wheels, muffled cylinder-cocks and screw-reversing mechanism. Steam is distributed to the cylinders by piston valves working above them, Walschaert valve motion being employed.

Leading dimensions are as follows:—

	Midi.	French State.
Cylinders, diameter	23 in.	23 in.
Piston stroke, diam.	26 in.	26 in.
Coupled wheels, diameter ..	4 ft. 7 in.	4 ft. 8½ in.
Wheelbase—		
Coupled	16 ft. 9 in.	16 ft. 9 in.
Engine	24 ft. 11½ in.	24 ft. 11½ in.
Heating surface—		
Tubes	1,295 sq. ft.	1,295 sq. ft.
Fire-box ..	142 sq. ft.	142 sq. ft.
Flues	545 sq. ft.	545 sq. ft.
Superheater ..	456 sq. ft.	456 sq. ft.
Total	1,982 sq. ft.	1,982 sq. ft.
Grate area.. ..	34·2 sq. ft.	34·2 sq. ft.
Boiler pressure ..	170·6 lb.	170·6 lb.

In working order the Midi locomotive weighs, with tender, about 118 tons, and the State engine, in like condition, about 120 tons. The tenders are of the eight-wheeled type with double bogies, having outside framing. Water capacity is the same in both cases, viz., 4,756 gallons. The tender of the Midi locomotive carries in addition 6 metric tons of coal, and that of the French State 5 metric tons.

Four-Track Mileage on the Midland Railway.

Commenting upon a general answer to a query by "Midland Enthusiast," published in "The Why and the Wherefore" last month, Mr. J. A. M. Rannie has kindly supplied a complete list of four-track sections on the Midland Railway, and as this is thought to be of wider interest, the essential particulars given by Mr. Rannie are given below:—

Main lines.—London (St. Pancras) to south end of Glendon and Rushton station; Wigston Junction to Tapton Junction (1 mile north of Chesterfield); Dore and Totley to Sheffield; Rotherham (Masborough) to south end of short tunnel near Sandal; Leeds Junction to Bradford (Market

Digitized by Google

Street). These are all arranged with slow and fast lines in separate pairs, but the slow lines are used for goods traffic only except on the following sections :—St. Paul's Junction (1 mile north of St. Pancras) to Carlton Road Junction (1 mile north of Kentish Town); Finchley Road to Harpenden Junction; Pytchley Junction (2 miles south of Kettering), and Glendon and Rushton; Codnor Park and Pye Bridge; Dore and Totley and Sheffield; Rotherham and Swinton; Cudworth and Royston and Notton; Leeds and Shipley Junction, and through Bedford and Wellingborough stations. On these sections only, therefore, are there platforms on the slow lines. Between Desborough and Rothwell to the south-east of Market Harborough station there is a third line (up goods), and a fifth line (down goods) from Toton Sidings at Ilkeston Junction. There are also four-line sections, with the passenger lines in the centre and goods outside, for 1 mile south of Wigston Junction, from Whittington to Barrow Mill, 1 mile south of Eckington, about a mile near Woodhouse Mill, Attercliffe Road to Holmes, through Normanton Station, Woodlesford to Leeds, and for 1 mile north of Bingley.

Other routes.—On the Manchester line from Derby North to tunnel north of Driffield, north of Darley Dale, and north of Chapel-en-le-Frith. In the case of the West of England lines, there are lengths of four-track between Derby and Wichnor Junction, from Water Orton to Saltley, and from King's Norton to Longbridge Junction (Halesowen branch). In the Manchester district the fast and slow lines are in separate pairs between Chinley and New Mills Junction.

Goods loops outside the passenger lines exist on the Kettering-Northampton loop near Manton, near Ashwell, and south of Melton Mowbray.

London's Traffic Problem.

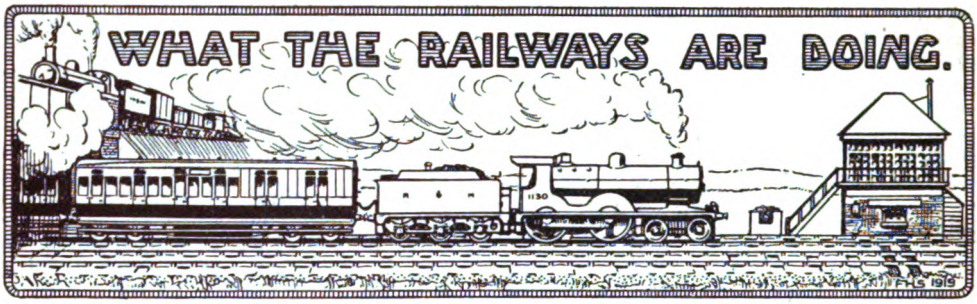
A LEADING article in the *Nineteenth Century* for May is a discussion on London's traffic problem, and the broad lines upon which its solution should be approached, by Lord Ashfield, Chairman and Managing Director of the Underground Group of transit organisation.

This is worthy of careful study throughout, especially as it is based upon the correlation of railway, tramway and motor omnibus facilities, and not upon any one method of transit; and some of the specific suggestions are of interest. For example, Lord Ashfield remarks: "The present underground railways will have to be supplemented by additional high-speed railways, with fewer stations, running north and south under or alongside the Baker Street and Waterloo Section of the London Electric Railway, and east and west under or alongside the District Railway." He also points out that as present costs of underground railway construction are prohibitive of any general scheme of new construction, further development of the underground system must rather be at the expense of the suburban branches of the main-line railways. There are many of these which could, with little new construction work, be linked up to the present underground railways, or to the suggested new high-speed railways, and without break of journey, carry the passenger direct from his home to his place of business. The experiment of running to Watford over the London and North Western Railway and projected through working over the Central London and Great Western Railways to Ealing, support this policy.

Closing Oxted Tunnel.

OXTED tunnel, on the London, Brighton and South Coast and South Eastern joint line from Croydon towards Tunbridge Wells, East Grinstead, Edenbridge, etc., has for some years been a frequent cause of trouble, and it has been decided that it must be reconstructed in the interests of safety and of the future It is 1 mile 506 yards in length, and is situated between Oxted and Woldingham stations. The district concerned is in considerable favour residentially, and for that reason special measures have been taken so that residential traffic will not be seriously incommoded. Trains will, therefore, pass through the tunnel during the period of business travel to the City for about two hours in the morning and for three hours in the evening (on Saturdays, afternoon instead), no trains being run on Sundays. At other times passengers for Oxted and beyond will require to travel via Redhill, Edenbridge, Three Bridges or East Grinstead, as may be most convenient, while South Eastern and Chatham season-ticket holders will also be permitted to use Caterham and Westerham stations, making their own road arrangements, though these stations are some miles distant. A single line is being laid through the tunnel in place of the present double-track, so that space on each side will be available for working. It is anticipated that at least eighteen months will be required, though the work will be expedited by using day and night and Sunday shifts.

Digitized by Google



Mr. James Armstrong Robinson, Chief Outdoor Assistant at Swindon to the Chief Mechanical Engineer of the Great Western Railway, whose retirement was announced recently, entered the service in 1870, as an apprentice at Chester. Two years after the completion of his apprenticeship he became Locomotive Foreman at Yeovil, and in 1885 District Foreman at Taunton. He held the latter post until 1894, when he was appointed Assistant to the Superintendent at Newton Abbott, where in 1897 he was made Divisional Locomotive Superintendent. This post he occupied for nine months, and then was transferred to Wolverhampton as Works Manager and Divisional Locomotive Superintendent. In 1913 he was appointed Outdoor Assistant at Wolverhampton, in addition to his other duties. Mr. Robinson comes of a family long connected with locomotive engineering, and his brother, Mr. J. G. Robinson, C.B.E., is Chief Mechanical Engineer of the Great Central Railway.

MR. JAMES ARMSTRONG ROBINSON,
Chief Outdoor Assistant to Chief Mechanical Engineer, G.W.R., who has retired after fifty years' service.

* * *

Lieut.-Col. H. M. Williams, Outdoor Assistant Carriage Superintendent, London and North Western Railway, has retired after 47 years' service. Entering the Carriage Works at Wolverton in 1872 as an apprentice he served in the works and offices at Wolverton under Mr. Bore and his successor, Mr. C. A. Park, until 1898, when he was appointed Outdoor Assistant. Throughout his career Colonel Williams has been closely identified with the Volunteer and Territorial Forces. On the formation of the Wolverton Works Company of the 1st Buckinghamshire Rifle Volunteer Corps in 1877, he joined, and was given a commission as Second-Lieutenant in 1880. He served through the intervening ranks to Lieutenant-Colonel commanding the battalion, retiring in April, 1914, when he was transferred to the Reserve of Officers. On the outbreak of the war in August, 1914, Colonel Williams was re-appointed to the active list to raise and train the 2nd Buckinghamshire Battalion, with which he proceeded to France early in 1916. Returning home on attaining the age limit for commanding officers, Colonel Williams resumed duty with the London and North Western Railway for a few months, and was then again called up and given a special appointment on the Army Staff in France, which re-took him into the front area where he remained till March, 1919, when he was demobilised, and retired with the rank of lieutenant-colonel. In addition to the mention in despatches Colonel Williams was "mentioned" for valuable services rendered at home in connection with the war. He twice received the thanks of the Army Council for work in connection with the Territorial Force, and in 1910, together with Sir Robert Turnbull and Mr. C. A. Park, received, through the General Manager of the London and North Western Railway, the thanks

Digitized by Google

of the Army Council for services rendered in connection with the scheme for the preparation of railway ambulance trains for use in war time.

* * *

MR. T. C. HIGGINS whose retirement from the position of Mineral Manager of the Great Central Ralway, was recorded in the April RAILWAY MAGAZINE, was recently entertained at dinner at the Hotel Great Central by his brother officers, both past and present, and presented with a handsome silver tea and coffee service, bearing the following inscription :—" Presented to T. C. Higgins, Esq., by his brother officers in token of their regard and esteem, on his retirement from the position of Mineral Manager of the Great Central Railway March 31, 1920." The presentation was made by Sir Sam Fay, General Manager, who referred to Mr. Higgins' genial character and even temperament, and also to the fact that the railways were, at the present time, passing through a difficult phase. He thought the British public would see to it that the railways were properly organised and managed, and that those who really knew their business were at the top. Mr. Edward Watkin, General Manager of tho Hull and Barnsley Railway (formerly Mineral Manager of the Great Central), referred to the pleasant relations which had existed during his association with Mr. Higgins. Sir James Ball, Engineer of the London, Brighton and South Coast Railway (formerly Chief Engineer of the Great Central) observed that there were no fewer than seven past officers of the company, including himself, amongst those met together to do honour to Mr. Higgins. This spoke well for the friendly feeling existing amongst the past and present officers of the company. Mr. Dixon H. Davies, the Great Central Railway solicitor, paid an eloquent tribute to the high tone and honourable standard which Mr. Higgins had always sought to maintain in all that he did. Mr. J. Rostern, Chief Goods Manager, also spoke in support. Mr. T. C. Higgins expressed his sincere thanks for the good wishes extended to him and for the beautiful present which had been bestowed by his brother officers. He thanked Mr. Rostern for his work in connection with the dinner, and also Mrs. Rostern for the trouble she had taken in choosing the present.

* * *

MR. F. J. RAMSDEN, Chairman of the Furness Railway recently unveiled a tablet erected at Moor Row to the memory of the railwaymen employed jointly by the London and North Western and Furness Railways on their joint line in West Cumberland, who either fell or served in the war. Twenty-one men joined the Colours, five were killed, four wounded and two taken prisoners. The tablet, which is in polished brass, was subscribed for by the soldiers' fellow railwaymen. Mr. L. Speakman, General Manager of the Furness Railway, presided, and after the unveiling ceremony an address was given by the Rev. Cæsar Caine, Vicar of Cleator, and a short service was conducted by the Rev. W. Thwaites, Rector of Egremont.

* * *

MR. CHARLES S. PAGE, District Superintendent at Hull, North Eastern Railway, has accepted the appointment of Assistant

MR. CHARLES S. PAGE,
Assistant General Manager,
Cardiff Railway and Bute Docks.

General Manager of the Cardiff Railway and Bute Docks. He started in 1886 as Junior Clerk in the General Goods Manager's Office, York, and in 1890 was transferred to the General Manager's Office. Three years later he became Personal Clerk to the General Manager, a position he held until 1901, when he was appointed Chief Clerk of the District Goods Manager's Office, Hull. The following year he became Assistant Yardmaster at Hull, and 12 months later Yardmaster. In 1907 Mr. Page was promoted to be Assistant Divisional Goods Manager at Hull, where he remained for three years, when he was appointed District Goods and Mineral Manager, Leeds and York district. In 1913 he was appointed District Superintendent at Hull.

Digitized by Google

MR. J. E. JERRETT who has been appointed Stationmaster at Waterloo, London and South Western Railway, was born in 1868, and has been 37½ years in the service. He joined in 1882, as parcel porter at North Tawton, and was transferred successively to the goods offices at Bideford in 1883, Gillingham, 1888, and Yeoford 1889, being placed on the Relief Staff at Exeter from 1891. In 1893 he became stationmaster's clerk at Templecombe and was moved to

MR. J. E. JERRETT.
Stationmaster,
L. & S.W.R., Waterloo.

Salisbury in 1899, where he held the position of stationmaster's clerk for 12 years. During this period the work was of an exceptional character in consequence of the rebuilding and enlargement of the station, provision of new goods yards and carriage sidings, and especially in connection with the installation of pneumatic signalling, Salisbury being the first important station on which this system was installed in England. In 1911 he was appointed Stationmaster at Datchet and three years later was moved to Feltham. In March, 1917, Mr. Jerrett was one of the two assistant stationmasters appointed at Waterloo. From all parts of tho system he has received congratulations on his honour of being placed in charge of the Company's most important station.

* * *

AN event of exceptional interest in railway circles recently took place, when the second annual Inter-Railway (Military Sections) dinner and concert, presided over by Mr. J. A. Owen, M.B.E. (South Eastern and Chatham Railway), was held in the Pillar Hall at the Cannon Street Hotel. A telegram from Mr. R. H. Nicholls, Superintendent of the Line, Great Western Railway, expressing his wishes for the success of the evening. was read. The speeches, commendably few in number and brief in length, were, after the toast "The Glorious Dead," couched in a very happy vein; in particular Mr. F. W. Smith (Great Central Railway), in proposing the health of the Chairman, humorously recalled his close associations with Mr. Owen during military manœuvres in pre-war days.

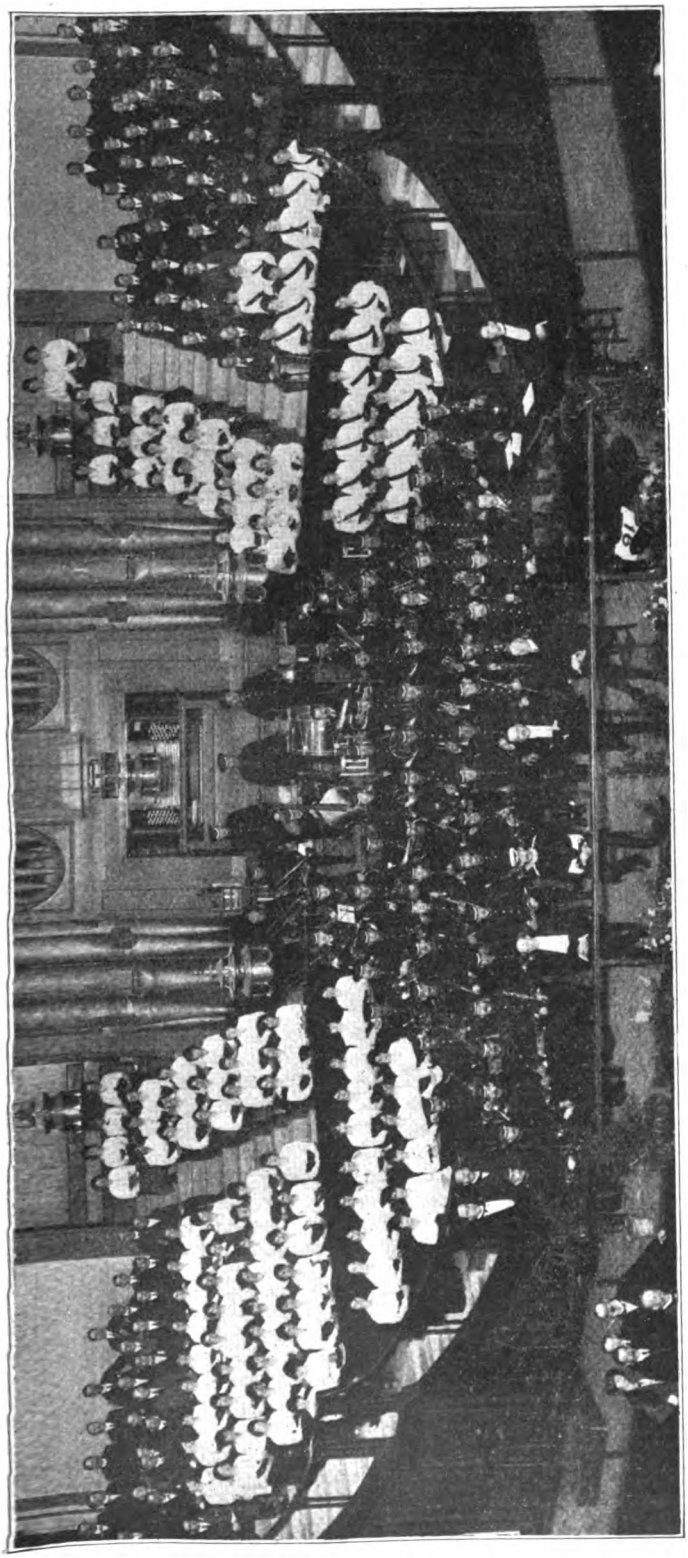
* * *

INCREASING membership has necessitated the removal of the Railway Club from its old address in Victoria Street, Westminster, to more commodious premises at 65, Belgrave Road, London, S.W. The new club rooms are six minutes' walk from the Victoria stations of the South Eastern and Chatham and London, Brighton and South Coast Railways. The club premises include a large room on the first floor for every-day use and a hall for the general monthly meetings and other gatherings that are arranged from time to time. It has been arranged for at least one member of the committee to attend at the Club each week-day evening. The Hon. Secretary, Mr. Edwin J. Miller, is now engaged in the production of a fine programme of autumn and winter events, while a number of summer outings have been arranged. RAILWAY MAGAZINE readers who contemplate membership should write to Mr. Miller without delay as a new half-year is about to commence.

* * *

ON Monday, April 26, the Central Hall, Westminster, was entirely filled by an appreciative audience assembled for the second concert of the T.O.T. Philharmonic Society. The first concert was given on March 22, and to follow by a second five weeks later affords indication of the vigour with which the society, formed only in January of this year, is pursuing its way. There are at present two sections, the choir and military band including over 300

Digitized by Google



T.O.T. PHILHARMONIC SOCIETY.

members, but an orchestral section is in course of formation, while a dramatic society is promised as a further phase of "Underground" activity on the social side. The performance on April 26 was of a high-class character, both the band under Mr. A. Goodfellow, and the choir under Mr. Ewart Beech, rendering individual selections in good style, while in certain items they were combined under the baton of Mr. J. A. Meale, F.R.C.O., who also rendered solo items on the organ in his usual high-class and popular style. Mr. A. E. Musgrave officiated at the organ during other items, Mr. H. Townsend and Mr. G. Murlis officiating as accompanists on the piano. Mr. A. Wellington was responsible for the platform management. The following artistes appeared with great satisfaction: Mr. Fred Gregory. Miss Helen Wilby, Miss Louise Trenton, Mr. Fred Gibson, and Mr. Fred Wilan whose "Phonofiddleoddities" were among the special successes of the evening. Lord Knutsford, a Director of the Underground Electric Railways Company of London, Ltd., presided, supported by Mr. H. E. Blain, Operating Manager, Mr. J. P. Thomas, Assistant Operating Manager, Mr. Frank Pick, Commercial Manager, Mr. S. J. Webb, Passenger Agent, Mr. C. J. Spencer, and other officers of the T.O.T. combination. In the course of a speech congratulating the society upon its work,

Digitized by Google

Viscount Knutsford referred to Lord Ashfield's interest in the social side of the "Underground" and made many delightfully humorous remarks concerning the "Underground" as viewed by the staff and by the general public.

* * *

AT a concert held under the auspices of the Royal Mint Street (Great Northern Railway) War Fund, to welcome back to railway life those of the staff who have been on active service during the Great War, advantage was taken of the opportunity of

Photo.] [*W. W. Guiver.*

MR. A. GOSTLING.

Great Northern Railway Agent, Royal Mint Street, 1898–1919.

presenting Mr. A. Gostling with a mark of esteem and appreciation on his retirement from the railway service. Mr. W. G. Sprague, who succeeded Mr. Gostling as agent of the Royal Mint Street station on January 1 last, made the presentation with a graceful speech. The gifts were a handsome gold watch chain and a framed illuminated address, also a gold expanding bracelet for Mrs. Gostling. Mr. Gostling served the Great Northern Railway 47 years. He was agent at Royal Mint Street, 1898 to 1919. He has a wide acquaintance with railway officers throughout Great Britain, having had in the past a long career as a canvasser.

* * *

THE Harwich-Hook of Holland service which recently has been augmented to run daily on week-days has now been considerably accelerated, the arrivals at the principal towns in the Netherlands being between one and four hours earlier. Through fares have been put into operation between London and the principal stations in North and South Germany, and passengers can now leave London by an express vestibuled corridor dining-car train which departs from Liverpool Street Station on week-days at 8.30 p.m. for Harwich, thence by fast turbine steamers to the Hook of Holland, and arrive at Cologne the next evening, and at Vienna the following evening. Tickets and full particulars may be obtained from the Continental Traffic Manager, Great Eastern Railway, Liverpool Street station, London, E.C. 2.

* * *

THE Lancashire and Yorkshire and North Eastern Railways have reinstated the service to Belgium *via* Hull and Zeebrugge, the first sailing from Hull (Riverside Quay) being on May 15, and the last for the season from Zeebrugge will be on October 5. The service will vary from two to three sailings per week in each direction. The chief feature is the introduction of week-end tours to the battlefields of Belgium. Passengers are enabled to leave towns in the North of England after business hours on Saturday and be back before noon on the following Tuesday, having visited such notable places as Zeebrugge, Ostend, Dixmude, Ypres, &c.

* * *

DAILY service on the Midland Railway Belfast *via* Heysham route was resumed by the Company's steamers on and from May 3 as follows:—Heysham depart for Belfast daily (Sundays excepted) 11.0 p.m. Belfast depart for Heysham 9.0 p.m. (Saturday and Sunday nights excepted), and 11.30 p.m. (Saturday nights only). Through carriages in each direction run between St. Pancras and Heysham.

* * *

ON the Great Northern Railway (Ireland) some very important train alterations were made in the May time-tables. The 9.15 a.m. train from Dublin to Belfast was accelerated so that it does the journey in 2 hours 35 min. as in pre-war days. A new express train leaves Dublin for Belfast at 12.30 p.m. Then there is the acceleration of the 3 p.m. train to its pre-war timing of 2 hours 30 min., and resumption of a non-stop run to Dundalk

Digitized by Google

in 64 min. There are also improvements in the opposite direction.

* * *

MR. EDGAR O. FERGUSON, Engineer of the Yorkshire Dales Railway, writing on the subject of congestion between the North Eastern, the London and North Western and Lancashire and Yorkshire systems, says:—"What would be a vast and permanent improvement would be to extend the Yorkshire Dales Railway from Grassington to Aysgarth, or down Coverdale to Spennithorne and Scorton. In promoting this scheme for the last 40 years it has never been a success by reason of the railway companies in no way assisting in the matter. The construction of this suggested railway would give the facilities that are now required, as well as opening out a vast area of agricultural land at present devoid of railway accommodation. The cost of the construction would not be excessive, and would favourably compare with a great expense of widening lines and stations, yards and sidings in the neighbourhood of Leeds and York."

* * *

THE miniature railway at Fairbourne, near Barmouth, is reopening. The 15-in. gauge "Atlantic" type engine has been thoroughly overhauled by the makers Messrs. Bassett-Lowke, Ltd., of Northampton. As probably RAILWAY MAGAZINE readers who have visited this spot are aware, the blowing sand is a great source of trouble on this little line, in addition to it sometimes covering the track two or three feet deep in a few hours; drifting sand also plays havoc with the motion of the locomotive and also the main bearings of the engine, tender and rolling-stock.

* * *

THE Ravenglass and Eskdale Railway summer time-table will be continued throughout the season with modifications to suit any alteration in the Furness Railway trains so as to make connections. We understand a new "Atlantic" type locomotive. *Sir Aubrey Brocklebank, Bart.*, is to be put into service early in June. This locomotive is of a similar design to the "Atlantic" type built by Messrs, Bassett-Lowke, Ltd., but has several departures from standard practice, such as copper fire-box, &c.

* * *

FOR the following notes on North British Railway locomotives the RAILWAY MAGAZINE is indebted to Mr. W. D. M. Stephens:—

"The latest 'Atlantic' to be re-built with 'Robinson' superheater and enlarged cylinders 21 in. by 28 in. is No. 878 *Hazeldean*. The 0-6-0 dock-shunting outside-cylinder tank engines had seven more added to their number last year, all being built at Cowlairs. Their numbers are 87, 271, 277, 279, 288, 289 and 290. These engines have 15 in. by 22 in. cylinders and 3 ft. 9 in. coupled wheels and a working pressure of 130 lb. per sq. in. This year the following new tank engines of the 0-6-2 class are already in service, namely, Nos. 22, 97, 96, 106 and 108. These are similar to previous engines of the same class, and have 18 in. by 26 in. cylinders and 4 ft 6 in. coupled wheels, and were built at the Atlas Works of the North British Locomotive Company, Glasgow. These engines all take the place of the small Drummond 15 in. by 22 in. 0-6-0 T class, the engines so replaced having been placed on the duplicate list. Last year 20 0-6-0 19½ in. superheater goods engines were built by the North British Locomotive Company, their numbers being 296, 300, 301, 302, 303, 306, 313, 470-473, 477-480, 485-489. Nos. 477-479, and 486-489 replace the Drummond 6 ft. 6 in. 4-4-0 locomotives which have been placed on the duplicate list. Nos. 402 and 491 are also 0-6-0 19½ in. goods engines, and have been turned out from the Atlas Works this year, No. 491 replacing a 6 ft. 6 in. 4-4-0. Several of these engines have two mechanical lubricators, one on the framing between the two front coupled wheels driven off a return crank on the axle of the front wheel, the other in the cab driven in a similar manner off the rear coupled wheel. One lubricator supplies oil to the cylinders and piston valves, the other to the axle-boxes of the coupled wheels. The following numbers of superheater locomotives are now in service—six 4-4-2 rebuilt; 20 4-4-0 'Scott' class; 20 4-4-0 'Glen' class; one 4-4-0 Holmes 'West Highland' rebuilt; 15 4-4-2 T; and 75 0-6-0 19½ in. goods engines, being a total of 137 superheater locomotives."

* * *

A HUDDERSFIELD RAILWAY MAGAZINE reader, Mr. W. A. Tuplin, communicates the following:—"As was stated in the February issue of the RAILWAY MAGAZINE, two London and North Western Railway locomotives of the 'Claughton' class are stationed at Longsight, and bear the number (16) of that shed. They are, however, regularly run from Leeds to Liverpool and back by men of the Farnley shed (Leeds). One of these locomotives, in charge of Longsight men, takes the 12.30 a.m. ex-Crewe mail-train to Leeds; the engine remains there till 10.30 a.m., when it is taken by Leeds men, to Liverpool, departing thence on the return journey at 2.40 p.m. Again in charge of Longsight men it leaves Leeds for Crewe with the 10.40 p.m. mail. Thus

Digitized by Google

the Leeds men have No. 250 'J. A. Bright' and No. 2042 on alternate days; this arrangement has been in operation since December last. I have noticed recently (though I understand that the device in question has been used for some considerable time), an arrangement for locking the reversing gear, which is fitted to all new locomotives of the 'Prince of Wales' class, and also to the earlier ones as they enter the shops. Between the curved guides of the Joy valve gear, two steel discs, apparently about 14 in. diameter, are attached to the reversing shaft. The piston of a cylinder placed under the shaft is attached to a block in contact with the discs. When steam is admitted to the cylinder, by a valve placed immediately above the reversing wheel in the cab, the block is tightly pressed against the discs, effectually preventing any movement of the guides. When the driver wishes to move the reversing gear he turns the valve into the 'off' position, exhausting the steam from the cylinder and releasing the reversing shaft. Owing to backlash in the reversing screw, and to slight play in the pin joints, the ordinary method of locking the reversing wheel does not entirely prevent movement of the guides when the engine is running, and the new device overcomes this defect."

* * *

On the London and North Western Railway the first of the new series of four-cylinder passenger engines ("Claughton" class) is now nearing completion. This will be No. 1914 *Patriot*. The engine replaced, viz., No. 1914 *Invincible* ("Renown" class) has been renumbered 1257. No. 2179 *Patience* 2-4-0 passenger engine, and No. 1599, 0-6-2 tank, have been withdrawn from service.

* * *

Mr. C. Moody writes:—"I was interested to learn, from the 'Why and Wherefore' column in the May Railway Magazine, that the North London Railway coaches loaned for service overseas have been 'demobilised.' This train was sent out to France *via* Havre in 1917. I saw it landed, and occasionally afterwards, bringing down loads of wounded to the Quai d'Escale at Havre. When demobilisation began the train was stripped of its ambulance fittings, furnished with rude wooden benches, and used as a 'demob rake,' bringing troops for dispersal to the base ports. These 'demob rakes' were all given names, mostly of Indian towns, &c., for telegraphic purposes; this North London train being known as 'Sukker.' Other trains I well remember were 'Karachi,' 'Jubbulpore,' 'Madras' and 'Pondicherry,' and no doubt Railway Magazine readers who were acquainted with military railway working in France will remember others. My last acquaintance with this North London rake was in July, 1919, when, headed by a 'W.D.' 4-6-0 Baldwin engine, it was used for a 'G.H.Q. Excursion' from Wimereux to Ypres. The characteristic heavy riding of North London Railway four-wheeled stock was not improved by the inequalities of the permanent way of the Chemin de Fer du Nord, and the rough seats of plain wood were most uncomfortable."

* * *

It is reported that the North Eastern Railway has just placed an important repeat order for 25 6-coupled side-tank locomotives with Armstrong, Whitworth & Co. One of the first orders for locomotives received by the firm was for 50 8-coupled goods engines and tenders from the North Eastern Railway, and although the conversion of Scotswood Works from munition making to locomotive construction was carried out simultaneously with the building of these engines, the progress was such, that within a year of the Armistice, the first engine was completed and delivered.

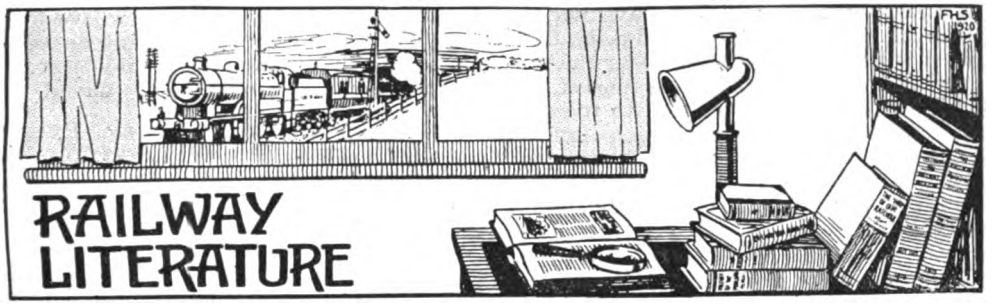
* * *

Mr. F. A. Hudson points out that Mr. Hewitt is not correct in stating, as reported on page 283 of the April Railway Magazine, that the same classification discs have been allotted to Great Western Railway 2-8-0 mineral engines and to the R.O.D. locomotives also in use. He explains that the former have a blue "E" and the latter a blue "D."

* * *

In the windows of the head European office of the Canadian Pacific Railway, 62-65, Charing Cross, London, S.W. is displayed a handsome mounted silver shield to be presented to the Army and Navy of the United States of America by the Imperial Services Boxing Association. Emblazoned around the shield is the American Eagle, the Stars and Stripes, and the arms of England, Scotland, Ireland, Wales and the Overseas Dominions. Designed by Harold Stabler, the trophy, which will be dispatched to the United States in the course of a few days, is inscribed:—"To the Army and Navy of the United States of America, from the Forces of the British Empire, 1919, this trophy is given in admiration of the sporting spirit in which the Americans entered and fought in the Boxing Tournament, London, December, 1918."

Digitized by Google



BUILDING THE PACIFIC RAILWAY. By Edwin L. Sabin. (J. B. Lippincott Co.) Price 8s. 6d. net.

On May 10, 1869, the Union Pacific and Central Pacific Railroads joined tracks, with suitable ceremony, at Promontory Point, Utah, thus completing the first railway across America from Atlantic to Pacific; and the record of this great achievement is well told in this interesting volume. Fifty years have elapsed since that date, and only now is the complete story told of how this link came to be made, seeing that a large part of the distance had to be covered through then almost unknown country, unpopulated except for Indians, whose marauding efforts frequently had to be fought off, the terrific transport and climatic difficulties which had to be surmounted, and the many financial and constructive problems involved. President Lincoln appears as a "friend in high places," affording assistance in the Legislature, but many other notabilities are mentioned, some who received their reward in due course, and others who gave their lives to the achievement. On the Union Pacific Oakes and Oliver Ames, Thomas C. Duvant, John Duff, Sidney Dillon, General "Jack" Casement (champion track-layer of the continent), and General Grenville M. Dodge, bore the brunt of the battle right through. Central Pacific men included Theodore D. Judah (engineer, who died before the work had been far advanced), Collis Potter Huntington, Charles Crocker and Mark Hopkins.

Construction was hampered from an early stage by the American Civil War, and this ran up the costs enormously. Eventually, indeed, time became of greater importance than money, and the whole undertaking had a distinctly sporting interest, for land grants went with the mileage constructed, and notable track-laying feats were performed on the plains, from 2½ miles per day to the culmination of 10 miles in the same period, 555 miles of main track in thirteen months by the Union Pacific, and 501 miles in nine months by the Central Pacific. In the mountains material difficulties on a gigantic scale had to be overcome; but "Crocker's Pets," 11,000 Chinamen, and Casement's army of Irishmen, appear to claim honours about equally divided. From Omaha westward, and from Sacramento eastward, work proceeded in feverish haste, until at Promontory Point, in the wilds of Utah, connection was made. Eventually the division point was placed at Ogden, but while the Union Pacific proceeded many miles beyond it, the work was to be charged to Central Pacific account. In July, 1864, the Union Pacific had not laid a rail out of Omaha, and the Central Pacific had constructed but 31 miles! By May 10, 1869, the Union Pacific had thus built 1,086 miles from Omaha, and the Central Pacific 690 miles from Sacramento, crossing the waterless deserts of Utah and Nevada and fighting a way through frowning mountain fastnesses. It is, indeed, a wonderful record, made with the relatively primitive appliances of the period, manual skill and numbers counting for most, instead of the excavating, grading and track-laying appliances associated with modern railway construction.

WESTWARD WITH THE PRINCE OF WALES. By W. Douglas Newton. [Hurst & Blackett, Limited. Price 8s. 6d. net.] Written by the special correspondent with the Royal party for the *Daily Chronicle*, this book gives an interesting record of the Prince of Wales' now historic tour of the Dominion from Newfoundland through Nova Scotia, Quebec, Toronto, Ontario, Ottawa, Montreal and Winnipeg, through the Rockies to Vancouver, and back via Niagara, Washington and New York. Thirty-two photographic illustrations are reproduced, and these add much to the interest and value of this chatty and

Digitized by Google

lively record of the great tour. The Royal train supplied by the Canadian Pacific Railway naturally figures prominently. As the author remarks: "If I have written much concerning the Canadian Pacific Railway it is because I feel that, under the personality of His Royal Highness himself, the success of the tour owes much to the care and efficiency that organisation exerted throughout its course, and also because for three months the Canadian Pacific Railway train was our home and the backbone of everything we did. . . We spent three months confined, more or less, to a single carriage . . . and after those three long months we left the train still impressed by the Canadian Pacific Railway, still warm in our friendship for it—perhaps, indeed, warmer in our regard."

CHART OF "PACIFIC" TYPE LOCOMOTIVE. [Angus Sinclair Company, Liberty Street, New York. Price 50 cents.] We have received from the publishers a copy of their latest chart, which shows on a large scale all essential parts of a modern 4-6-2 locomotive, with full references and explanations of their names and functions

LOCOMOTIVE MANAGEMENT, FROM CLEANING TO DRIVING. By Jas. T. Hodgson and John Williams. [London: the proprietors of *The Railway Engineer*, Queen Anne's Chambers, S.W. 1.] Price 7*s*. 6*d*. net. A fourth edition of this very valuable textbook has just been published and is in stock at the RAILWAY MAGAZINE offices, 30, Fetter Lane, Fleet Street, London, E.C. Its price by post is 8*s*. The exhaustion of the third edition has provided a further opportunity of again bringing the book up-to-date, and with this end in view, the text has been considerably revised, while a certain portion of the more or less obsolete matter has been deleted. A large portion of the matter relative to exhaust steam injectors and locomotive superheaters has been entirely re-written, and it must be admitted that the inclusion in the fourth edition of other additional details appertaining to recent developments in modern locomotive engineering practice will be found extremely useful by persons interested or concerned in locomotive management. It is a book one can strongly recommend.

CANADIAN PACIFIC RAILWAY BUDGET. AGRICULTURAL AND INDUSTRIAL PROGRESS IN CANADA.

CANADIAN PACIFIC RAILWAY TRAIN PICTURES

Issued by the Canadian Pacific Railway in pursuance of their forward publicity programme, these publications will be highly appreciated by all interested in the affairs of the Dominion and the Canadian Pacific Railway. The *Canadian Pacific Railway Budget* is an attractively produced number of magazine type, including portraits and many illustrations and articles of historic, railway and general Canadian interest. The second publication noted presents a monthly review of agricultural and industrial progress in Canada; while the third is a neat pamphlet of train pictures of the "Trans-Canada" express. Copies can be had on application to Sir George McLaren Brown, European General Manager, at the London Offices, 62-65, Charing Cross, S.W., and 91, Bishopsgate, E.C.2.

THEORY AND PRACTICE OF LUBRICATION: The "Germ" Process. By H. M. Wells and J. E. Southcombe, M.Sc. [Henry Wells Oil Company, 11, Haymarket, London, S.W.1] A report of a Paper read before the Society of Chemical Industry. Copies can be had on application to the firm mentioned.

VICKERS' NEWS. Issued as the "house magazine for this well-known firm, *Vickers' News* has now reached the first number of a second volume. It is attractively produced, with good and interesting illustrations covering a wide range of subject matter, and must take its place among the best of publications of its class.

July "Railway Magazine" will commence a New Volume.

Frontispiece will be a Large Colour Plate of G.N.R. 2-6-0 Express Goods Locomotive, No. 1000, a companion picture to G.W.R. "Great Bear," presented with the last January Number.

74533.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

32101 076428901

Digitized by Google

R
M

V

Digitized by Google